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DESCRIPTION OF UNITS, SPECIFICATIONS, AND DRAWINGS
FOR 14.4/24.9 KV LINE CONSTRUCTION



RURAL ELECTRIFICATION ADMINISTRATION
U. S. DEPARTMENT OF AGRICULTURE

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PART I. DESCRIPTION OF CONSTRUCTION UNITS
(For Use in Preparing Contractor's Proposal)

The proposal is to be made on a unit basis so that the Engineer may specify any combination of construction units that he may deem necessary. The various construction units that are included in this proposal, and upon which quotations are required, are defined by symbols and descriptions set forth in this part I. Separate assembly units are designated for each different arrangement which may be used in the construction of the Project. This proposal is based on a consideration of each unit in place and includes only the materials listed on the corresponding Construction Drawings.

1. Pole Unit. Consists of one pole in place. It does not include pole-top assembly unit or other parts attached to the pole. The first two digits indicate the length of the pole; the third digit shows the classification per A.S.A. (Example: 25-6 means a pole 25 feet long, class 6.)

2. Pole-top Assembly Unit. Consists of the hardware, crossarms, and their appurtenances, insulators, etc., except tie wire, required to support the primary conductors. It does not include the pole. Crossarm pins include 2 inches by 2 inches by 1/8 inch washer, nut, and locknut.

3. Guy Assembly Unit. Consists of the hardware and wire, and guy insulator where necessary. An overhead guy assembly consists of an overhead guy, a pole, and a down guy, each of which is listed separately. Guy guards are designated separately.

4. Anchor Assembly Unit. Consists of the anchor with rod complete, ready for attaching the guy wire.

5. Conductor Assembly Unit. Consists of 1,000 feet of a single conductor for primaries, secondaries, or both, and includes tie wires, sleeves for splicing, and armor rods with clips or armor wire where necessary. Tree trimming necessary for installing secondaries on poles not carrying primary line is included with the conductor assembly unit and shall be performed in accordance with the directions of the Engineer. The length of conductor shall be determined by taking the sum of all straight horizontal span distances between pole stakes or from center to center of the poles carrying the conductors. The conductor sizes listed are the manufacturer's designation.

6. Transformer Assembly Unit. Consists of the transformer, its protective equipment, and its hardware and leads with their connectors and supporting insulators and pins. This unit does not include the pole top, secondary, service, or grounding assemblies.

7. Secondary Assembly Unit. Consists of the hardware, insulators, etc., required to support the secondary conductors. It does not include the secondary conductors, or any hardware, insulators, etc., added to support the service conductors.

8. Service Assembly Unit. Consists of 1,000 feet of single conductor measured horizontally between conductor supports. The service shall be connected to the secondary or transformer and 2 feet of conductor shall be left for connecting to the consumer's service entrance, but in computing compensation to the Contractor only the horizontal distance between conductor supports shall be used. The service assembly unit includes tie wires, sleeves for splicing, connectors, and consumable materials. Tree trimming necessary for installing services is included with the service assembly unit and shall be performed in accordance with the directions of the Engineer. The hardware and insulators at the points of conductor support are designated as separate items.

9. Miscellaneous Assembly Unit. Consists of additional units needed in the Project for line construction but not otherwise listed in the Proposal.

10. Right-of-way Clearing Units.

R1-10R. The unit for purpose of quoting is 1,000 feet in length and 10 feet in width (to be measured 10 feet on one side of the pole line) of actual clearing of right-of-way. This includes clearing of underbrush, tree removal, and such tree trimming as may be required to leave an unobstructed right-of-way from the ground up on one side of the line of poles carrying conductors other than secondaries and services of the width specified. The length of actual clearing shall be measured in a straight line parallel to the line between poles and across the maximum dimension of foliage cleared (not trunk) projected to the ground line. All trees and underbrush across the width of the right-of-way shall be considered to be grouped together as a single length in measuring the total length of clearing. Spaces along the right-of-way in which no trees are to be removed or trimmed or underbrush cleared shall be omitted from the total measurement. All length thus arrived at, added together and divided by 1,000, shall give the number of 1,000-foot R1-10R units of clearing. This unit includes the removal or topping, at the option of the Contractor, of danger trees outside of the right-of-way when so designated by the Engineer. (Danger trees are defined as dead or lean-

ing trees which, in falling, will affect the operation of the line.) The Contractor shall not remove or trim shade, fruit, or ornamental trees unless so directed by the Engineer.

R1-20R. This unit is identical with R1-10R except that width is 20 feet (to be measured 10 feet on each side of the pole line).

R1-30R. This unit is identical with R1-10R except that width is 30 feet (to be measured 15 feet on each side of the pole line).

R1-40R. This unit is identical with R1-10R except that width is 40 feet (to be measured 20 feet on each side of the pole line).

11. Substation Assembly Unit. Consists of the complete substation ready for connection of the line conductors, as shown on the substation drawing.

PART II. DESCRIPTION OF SYSTEM LINE CHANGES

The general heading of line changes applies to the changing of existing lines or portions thereof from their existing phasing, wire size, and type to new phasing, wire size, and type and the removal of existing lines or portions thereof and replacing with new lines in close proximity thereto. In general line changes involve three types of assembly units as follows:

Section H--Conversion assembly units;

Section I--Removal assembly units;

Section N--New construction assembly units on existing lines or in replacing lines.

The proposal is to be made on a unit basis so that the Engineer may specify any combination of assembly units that he may deem necessary. Work performed under these sections shall be performed under the special conditions of energization as set forth in the Proposal. The various assembly units that are included in this Proposal and upon which quotations are required, are defined by symbols and descriptions set forth in this part II.

1. Section H--Conversion Assembly Units.

Conversion assembly units are pole-top assemblies and cover the furnishing of all labor for changing an existing assembly unit to a new assembly unit, utilizing certain items of material of the existing assembly unit on poles to be left in place.

Where replacement of a pole is required, the existing pole and pole-top assembly will be removed under Section I and the new pole and pole-top assembly will be installed according to Section N and no H units will be involved.

Any materials removed from the existing assembly units which are not required in the construction of the conversion assembly unit, approved for reuse by the Engineer, shall be reused by the Contractor in the construction of other assembly units called for in the Construction Contract.

The Contractor will be charged by the Owner for the full value of all material items removed under this section at the value shown in Table A. Such charges will be placed against the Contractor as the material is removed.

The material that is removed may be utilized in the construction of new assembly units in the prosecution of this Contract or returned to the Owner's warehouse at the option of the Engineer. Material that is reused will be credited to the Contractor at the time it is reinstalled. Material not used and not damaged in handling will be credited to the Contractor at the time it is returned to the warehouse. The Contractor will be allowed full credit at the values as shown in Table B for all material items used and for all material items returned to the Owner which, in the opinion of the Engineer, were not damaged by the Contractor in removal and handling even though the materials may not be reusable for reasons of obsolescence.

Conversion assembly units are specified by the prefix H with the new construction assembly unit designation shown first and the existing assembly unit designation shown last. For example, an H B1-A1 signifies the conversion of an existing A-1 assembly unit to a B-1 assembly unit (as was defined in the description of construction assembly units). In this instance the Contractor utilizes the existing pin-type insulator, single upset bolt and neutral spool and installs the additional cross-arm, crossarm pins, braces, machine bolt, carriage bolts, lag screw, and insulator supplied by the Owner required for the new unit. The Contractor transports the pole-top pin and two machine bolts to the warehouse or reuses them on the project as directed by the Engineer.

The Conversion assembly units also include the furnishing of all labor in the transferring, re-sagging, and retying of conductors from one position on the pole to a different position on the pole where such transfers are required. Where replacement of conductor is required, the existing conductor will be removed under Section I and the new conductor installed under Section N.

The Contractor's proposal form for conversion assemblies is divided into three subsections.

- a. Subsection H (C-A). Conversion of single-phase assemblies to three-phase assemblies as described:

Unit	Description
H (C1-A1)	(To be filled in by Engineer, i.e., conversion of existing A-1 on pole to C-1.)
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	

- b. Subsection H (B-A). Conversion of single-phase assemblies to V-phase assemblies as described:

Unit	Description
H (B1-A1)	(To be filled in by Engineer, i.e., conversion of existing A-1 on pole to B-1.)
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	

- c. Subsection H (C-B). Conversion of V-phase assemblies to three-phase assemblies as described:

Unit	Description
H (C1-B1)	(To be filled in by Engineer, i.e., conversion of existing B-1 on pole to C-1.)
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	
H _____	

TABLE B. Values of Material Items Creditable to Contractor

[illegible]

*See "List of Materials Acceptable for Use on Systems of REA Electrification Borrowers".

2. Section I--Removal Assembly Units.

Removal assembly units cover the furnishing of all labor for the removal of existing units of construction from existing lines, disassembling into material items, and all labor and transportation for the returning of all materials to the warehouse of the Owner in an orderly manner or transporting elsewhere to the site of the project for reuse in the prosecution of this Contract as approved by the Engineer.

The Contractor will be charged by the Owner for the full value of all materials removed under this section at the value shown in Table C. Such charges will be placed against the Contractor as units are removed.

Of the materials listed in Table C to be removed from existing lines, certain materials will be reused in the construction of the Project. Such materials to be reused are listed in Table C-1. Materials other than those listed in Table C-1 shall, if not damaged in handling, be returned to the Owner for full credit at the values shown in Table D. The Contractor will be allowed full credit for all material items, other than those listed in Table C-1, returned to the Owner which, in the opinion of the Engineer, were not damaged by the Contractor in removal and handling even though the materials may not be reusable for reasons of obsolescence or deterioration. Such credits shall be allowed the Contractor as materials are returned to the Owner's warehouse.

The Contractor shall not receive payment for any removal units until he shall have returned the materials removed to the Owner or the materials shall have been certified for reuse in the construction of the Project by the Engineer.

The unit removal prices shall include all labor required to reinstall in accordance with specifications any conductors temporarily detached. The Contractor will reinstall at his own expense any other units removed by him for his own convenience.

The removal units are specified by the prefix I and followed by the assembly unit designation of existing assembly unit to be removed. For example, an I A1 signifies the removal of an A1 assembly unit. The following special notes apply to specific removal units:

a. Poles. All poles of the same height, regardless of pole class, are designated by the same unit. Thus an I 30-foot pole signifies the removal of a 30-foot pole of any class. The contractor is not required under this unit to remove from the pole any ground wire or pole numbering attached to the pole. This unit includes the refilling and tamping of holes in a workmanlike manner unless they are to be reused.

b. Pole-top Assemblies. The unit for removal of pole-top assemblies is designated by the prefix I followed by the symbol of the assembly to be removed, thus I A5-4R signifies the removal of an A5-4R assembly unit.

The unit of removal of pole-top assemblies includes any necessary handling, resagging, and retying of conductors in those cases where an existing pole-top assembly will be removed and replaced by a new pole-top assembly and where any existing conductor is to be reused.

The unit of removal of pole-top assemblies also includes any holding or handling of mainline or tap conductors at tap lines, angles, and deadends where such is involved, and the reinstalling of such conductor in accordance with the conductor specifications herein; for example, an I A5-4R will include the disconnection of the tap conductors, snubbing off the tap line at the nearest practical point and the reconnection and resagging of these tap conductors if necessary to the new tap assembly when installed. The new unit of construction, however, will be specified separately in Section N.

c. Guys. All guys regardless of length, type of attachment, or size of guy strand are specified by the same unit; thus an I-E signifies the removal of any guy.

d. Anchors. Only anchor rods are to be removed by the Contractor in anchor removal units. The anchors will be left in the ground; thus an I-F signifies the removal of any anchor rod.

e. Conductor. The conductor removal unit covers the removal of 1,000 feet of conductor and reeling or coiling it in a workmanlike manner in such a way that it can be reused by the Contractor or the Owner. The Owner will furnish to the Contractor reels for the reeling of such conductor if it is to be returned to the Owner's warehouse on reels. All jumpers, tie wires, armor rods, and other conductor accessories removed will be returned to the Owner. The removal unit for each size of conductor is shown by the prefix I followed by D and the conductor type; thus an ID-6A-CWC signifies the removal unit for 1,000 feet of 6A copperweld conductor.

f. Transformers. The unit for removal of transformer assembly units is divided into two sections, (1) Conventional Transformer Assembly, and (2) Self-protected Transformer Assembly. Only one unit is specified for each type, and all sizes of transformers from 1 to 15 kva within each group will be covered by the same unit. "Self-protected" refers to transformers where all protective equipment is mounted on or within the transformer. "Conventional" refers to transformers where protective equipment is mounted separately from the transformer. The unit is designated by the prefix I followed by the description of the unit to be removed; thus I-G Conventional signifies the removal of a conventional transformer assembly for any size transformer from 1 to 15 kva.

g. Secondary Units. The unit for removal of secondary assemblies includes, in addition to the removal of the assembly itself, all necessary handling such as untying, resagging, and retying of secondary conductor where existing secondary conductor is to be reused.

In addition, the unit for removal of the secondary assembly includes the handling or holding of any conductor at tap lines where such is involved, and the reinstalling of such tap conductor in accordance with the conductor specifications herein. The unit removal of secondary assemblies is designated by the prefix I followed by the symbol of the secondary assembly involved; for example, an I-J6 signifies the removal of a J6 secondary assembly. In this instance if a tap line is involved, it includes the disconnection of the tap conductor, snubbing off the tap line at the nearest practical point and the reconnection and resagging of the tap conductor to the new secondary assembly when installed; such new unit of construction however being separately specified under Section N.

h. Service Unit. The service removal unit is designated by the prefix I followed by the symbol of the service unit to be removed; thus an IK14 signifies the removal of a K14 service assembly unit.

No separate removal units will be specified for service wire units except where complete removal is required. Where service conductor must be dropped to provide for removal and installation of service attachment units, the labor of dropping and reinstalling service conductor, together with any additional service conductor and sleeves to complete the reinstallation thereof is included in the unit for removal of the service wire attachment.

In the above instance the IK14 will include the disconnecting and reconnecting of the service wire according to specifications.

i. Miscellaneous Units. The miscellaneous removal unit is designated by the prefix I followed by the symbol of the unit to be removed; thus an I-M3-1R signifies the removal of an M3-1R assembly unit. (The Engineer is to furnish under this section any detail descriptions of Miscellaneous removal units as are required.)

The units as covered by this Section I, Removal Assembly Units, are generally the same as those described in part I, Description of Construction Units. Where such description is not correct or sufficiently explicit, the following descriptions will apply:

Unit	Description
I	(To be filled in by Engineer.)

TABLE C-1. Material Items To Be Reused

[illegible]

*See "List of Materials Acceptable for Use on Systems of REA Electrification Borrowers".

TABLE D. Values of Material Items Creditable to Contractor

[illegible]

*See "List of Materials Acceptable for Use on Systems of REA Electrification Borrowers".

TABLE D. Values of Material Items Creditable to Contractor--Continued

[illegible]

*See "List of Materials Acceptable for Use on Systems of REA Electrification Borrowers".

3. Section N--New Construction Assembly Units on Existing Lines or in Replacing Lines.

The purpose of this section is to list complete new units of construction where such units are to be added to existing lines or installed in replacing lines.

The units as covered by this section are the same as the units described in part I, Description of Assembly Units, except that these units are prefixed by the letter N.

For example, an N40-6 unit covers the furnishing of all labor for the installation of a 40-6 pole either in an existing distribution line being operated by the Owner or in a new line being constructed to replace an existing distribution line being operated by the Owner.

PART III. SPECIFICATIONS FOR CONSTRUCTION

1. General.

All construction work shall be done in a thorough and workmanlike manner in accordance with the Staking Sheets, Plans and Specifications, and Construction Drawings, and shall be subject to the acceptance of the Engineer and the Administrator.

Deviations from the Staking Sheets, Plans and Specifications, and Construction Drawings shall not be permitted except upon the written permission of the Engineer given with the approval of the Administrator.

2. Scope.

Miles of line

Primary lines:

	Volts	Miles
Single-phase two-wire	_____	_____
V-phase three-wire	_____	_____
Three-phase four-wire	_____	_____

Secondary:

Two-wire secondary on secondary poles	_____	_____
Three-wire secondary on secondary poles	_____	_____

Services:

Two-wire services	_____	_____
Three-wire services	_____	_____
Total miles of line	_____	_____

Underbuild

One-wire secondary	_____	_____
Two-wire secondary	_____	_____
Total miles of underbuild	_____	_____

Line changes

Single-phase to V-phase	_____	_____
Single-phase to three-phase	_____	_____
V-phase to three-phase	_____	_____
_____	_____	_____
_____	_____	_____
Total miles	_____	_____

Removals

Single-phase two-wire	_____	_____
V-phase three-wire	_____	_____
Three-phase four-wire	_____	_____
Total miles	_____	_____

Miscellaneous

Services:

	Number
Two-wire to meter	_____
Three-wire to meter	_____
Three-phase to meter	_____

Secondaries to meter:

Two-wire secondary to yard pole	_____
Three-wire secondary to yard pole	_____
Three-phase secondary to yard pole	_____

Substations:

Kva _____ Voltage _____ Type _____	_____
Kva _____ Voltage _____ Type _____	_____
Clearing units	_____
Consumers	_____

The total length of the project lines shall be determined by taking the sum of all straight horizontal span distances between pole stakes or from center to center of poles carrying conductors, plus the length of service drops measured horizontally from center of last pole to the point of attachment to the consumer's building.

The Project is located in the County or Counties of _____,
State of _____. Said lines are to be connected to the primary
system of _____

at the following locations _____

All of the above is as included within the terms of the Loan Contract.

3. Drawings and Maps.

The key map showing the source of power supply and the general route and location of all primary lines in this Project, and the detail maps for each individual primary route, are listed separately hereinafter and are part of these Plans and Specifications and no deviations from these maps shall be made without the approval of a Construction Contract Amendment by the Administrator. The Construction Drawings, showing the types of construction to be used for the various conditions along the lines, also are listed separately hereinafter and are part of these Specifications.

4. Staking of Line.

The Engineer shall determine the locations and types of all pole units and other unit assemblies to be installed. As a part of the release for construction, the Contractor shall receive from the Engineer five complete sets of staking sheets and a reference sketch showing the location of the poles and other unit assemblies.

5. Distributing Poles.

In distributing the poles, large, choice, close-grained poles shall be used for transformer, dead-end, angle, and corner poles.

6. Pole Setting.

The minimum depth for setting poles shall be as follows:

Length of Pole (feet)	Setting in Soil (feet)	Setting in All Solid Rock (feet)
20	4.0	3.0
25	5.0	3.5
30	5.5	3.5
35	6.0	4.0
40	6.0	4.0
45	6.5	4.5
50	7.0	4.5
55	7.5	5.0
60	8.0	5.0

"Setting in Soil" specifications shall apply:

- Where poles are to be set in soil.
- Where there is a layer of soil of more than two (2) feet in depth over solid rock.
- Where the hole in solid rock is not substantially vertical or the diameter of the hole at the surface of the rock exceeds approximately twice the diameter of the pole at the same level.

"Setting in All Solid Rock" specifications shall apply where poles are to be set in solid rock and where the hole is substantially vertical, approximately uniform in diameter and large enough to permit the use of tamping bars the full depth of the hole.

Where there is a layer of soil two (2) feet or less in depth over solid rock, the depth of the hole shall be the depth of the soil in addition to the depth specified under "Setting in All Solid Rock" provided, however, that such depth shall not exceed the depth specified under "Setting in Soil."

On sloping ground, the depth of the hole always shall be measured from the low side of the hole.

All holes shall be backfilled with soil or small rock and all pole holes in rock shall be inspected and approved in writing by the System Engineer before being backfilled.

Poles shall be set so that alternate crossarm gains face in opposite directions, except at terminals and deadends where the gains of the last two poles shall be on the side facing the terminal or deadend. On unusually long spans, the poles shall be set so that the crossarm comes on the side of

the pole away from the long span. Where pole top pins are used, they shall be on the opposite side of the pole from the gain, with the flat side against the pole.

7. Pole Alinement and Raking.

Poles shall be set in alinement and plumb except at corners, terminals, angles, junctions, or other points of strain, where they shall be set and raked against the strain so that the conductors shall be in line. Poles shall be raked against the conductor strain not less than 1 inch for each 10 feet of pole length nor more than 2 inches for each 10 feet of pole length after conductors are installed at the required tension.

8. Tamping.

Poles must be thoroughly tamped the full depth. Excess dirt must be banked around the pole.

9. Grading of Line.

When using high poles to clear obstacles such as buildings, foreign wire crossings, railroads, etc., there shall be no upstrain on pin-type insulators in grading the line each way to lower poles.

10. Guys.

The Engineer shall determine all guy locations and specify the type of guy. Guys shall be placed before the conductors are strung and shall be attached to the pole as shown in the Construction Drawings.

11. Anchors.

All anchors and rods shall be in line with the strain and shall be so installed that approximately 6 inches of the rod remain out of the ground.

When a cone anchor is used, the hole, after the anchor has been set in place, shall be backfilled with coarse crushed rock for 2 feet above the anchor, tamping during the filling.

The setting of each anchor as regards depth, position, and expansion shall be inspected by the Engineer and the Engineer's approval given in writing before the anchor hole shall be backfilled.

All anchors must be thoroughly tamped the full depth of the hole.

12. Conductors.

Conductors must be handled with care. Conductors shall not be tramped on or run over by vehicles. Each reel shall be examined and the wire shall be inspected for cuts, kinks, or other injuries. Injured portions shall be cut out and the conductor spliced. The conductors shall be pulled over suitable rollers or stringing blocks properly mounted on pole or crossarm if necessary to prevent binding while stringing.

The neutral conductor should be maintained on one side of the pole (preferably the road side) for tangent construction and for angles not exceeding 30 degrees.

With pin-type insulators the conductors shall be tied in the top groove of the insulator on tangent poles and on the side of the insulator away from the strain at angles. Pin-type insulators shall be tight on the pins and on tangent construction the top groove must be in line with the conductor after tying in.

For neutral and secondary conductors on poles, insulated brackets (Material Item da) may be substituted for the single and double upset bolts on angles of 0° to 5° in locations known to be subject to considerable conductor vibration.

13. Splices, Deadends, Taps, and Jumpers.

Conductors shall be spliced and deadended as shown on the Construction Drawings. There shall be not more than one splice per conductor in any span and splicing sleeves shall be located at least 10 feet from the conductor support. No splices shall be located in Grade B crossing spans and preferably not in the adjacent spans.

Jumpers and other leads connected to line conductors shall have sufficient slack, as shown on the Construction Drawings, to allow free movement of the conductors. Where slack is not shown on these drawings it will be provided by at least two bends in a vertical plane, or one in a horizontal plane, or the equivalent.

When connecting conductors of different metals, connectors which cause no galvanic action shall be used.

With all conductors, connectors and hot-line clamps shall be installed as shown on guide drawings, near the conductor support. On all hot-line clamp installations, the clamp shall be installed so that it is permanently bonded to the load side of the line, allowing the jumper to be deenergized when the clamp is disconnected. This applies in all cases, even where the line layout is such that the tap line is in actuality the main line back to the power source.

14. Tie Wires, Etc.

All ties shall be in accordance with the Construction Drawings.

15. Sagging of Conductors.

Conductors shall be sagged in accordance with the Conductor Manufacturer's recommendations which shall be furnished to the Contractor by the Engineer. When so specified in the Proposal conductors shall be prestretched and then sagged in accordance with the proper final sag and tension charts supplied by the conductor manufacturer and furnished to the Contractor by the Engineer.

All conductors shall be sagged evenly, and if prestretched, a tension indicator approved by the Engineer shall be used. The stringing and sagging tensions shall be supplied by the Engineer.

The air temperature at the time and place of stringing shall be determined by a certified etched glass thermometer.

The sag of all conductors after stringing shall be in accordance with the Conductor Manufacturer's recommendations, except that a maximum increase of 3 inches of the specified sag in any span will be acceptable: Provided, however, that under no circumstances will a decrease in the specified sag be allowed. While it is the responsibility of the Project Engineer to so design the line that the required clearances are obtained, the Contractor shall not be relieved from its responsibility of properly sagging conductor as above stated.

16. Clearing Right-of-way.

In preparing the right-of-way, trees shall be removed, underbrush cleared, and trees trimmed so that the right-of-way, except for tree stumps which shall not exceed _____ in height, shall be clear from the ground up and of the width specified in the Proposal and Construction Agreement. Trees fronting each side of the right-of-way shall be trimmed symmetrically unless otherwise directed by the Engineer. Dead trees beyond the right-of-way which would strike the line in falling shall be removed. Leaning trees beyond the right-of-way which would strike the line in falling and which would require topping if not removed may be removed or topped at the option of the Contractor except that the Contractor shall trim and not remove shade, fruit, or ornamental trees unless otherwise directed by the Engineer.

Trees that are felled shall be cut to commercial wood length and left on the side of the right-of-way for the landowner. Commercial wood length means the length designated by the Engineer but in no case shall it be required to be less than _____ (_____) feet. Brush, branches, and refuse shall, without delay, be disposed of by such of the following methods as the Engineer will direct (Engineer to strike out methods not to be used)

- a. Burned.
- b. Removed from the vicinity of the right-of-way.
- c. Piled on one side of the right-of-way in such manner as not to obstruct roads, ditches, drains, etc.

(Engineer)

(Date)

All right-of-way operations shall be carried out as directed by the Engineer in a manner to preserve symmetrical appearance and in accordance with the Construction Drawings.

17. Services.

The span length of any covered wire shall not exceed 150 feet. Service conductors shall be so installed as not to obstruct the climbing space. There shall be not more than one splice per service conductor in any span, and splicing sleeves shall be located at least 10 feet from the conductor support.

Conductors shall be sagged in accordance with instructions which shall be furnished to the Contractor by the Engineer.

18. Grounds.

Ground rods shall be driven full length in undisturbed earth in accordance with the Construction Drawings. The top shall be at least 12 inches below the surface of the earth. The ground wire shall be attached to the rod with a clamp and secured to the pole with staples. The staples on the ground wire shall be spaced 2 feet apart except for a distance of 8 feet above the ground and 8 feet down from the top of the pole where they shall be 6 inches apart.

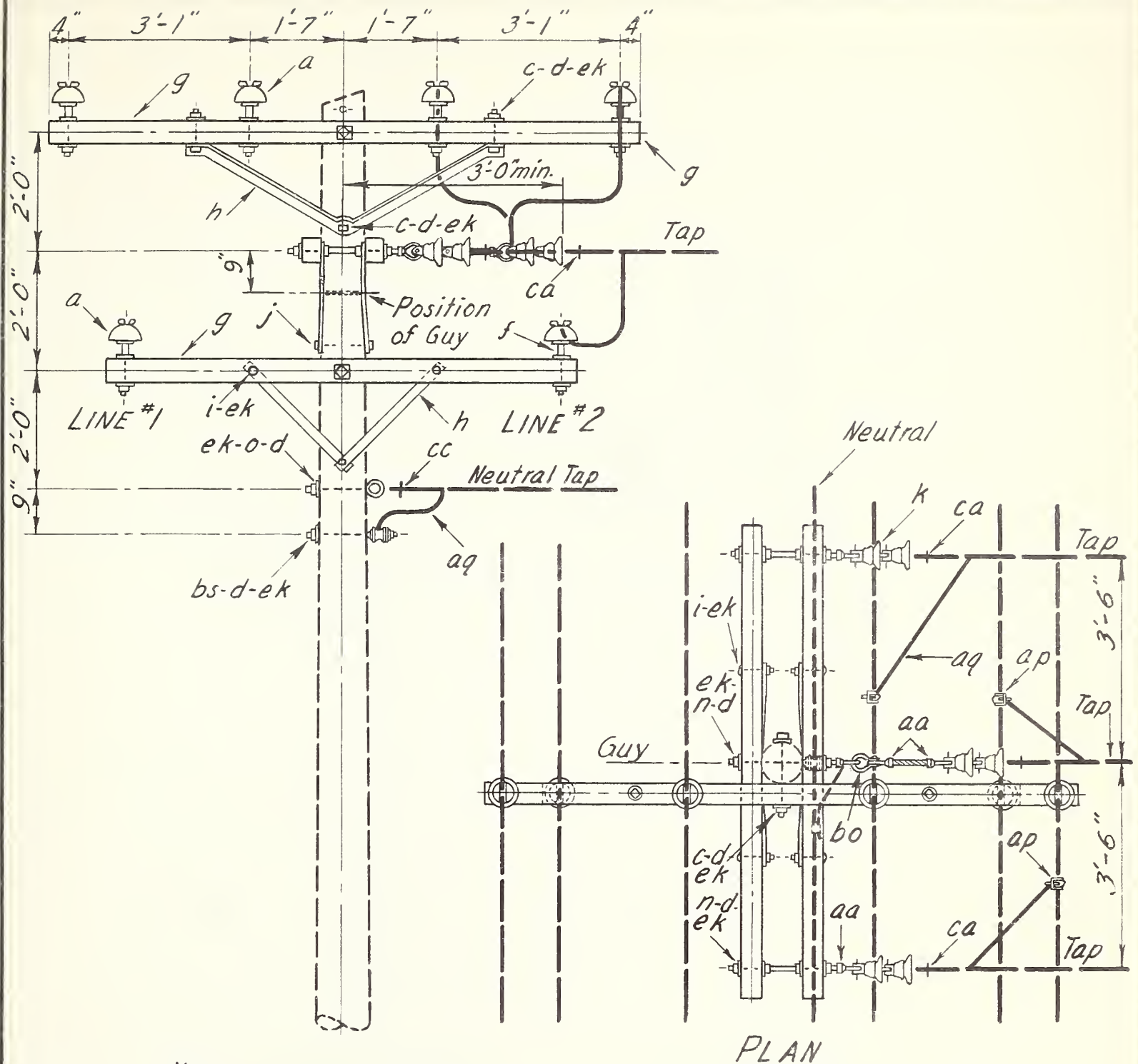
The transformer case, neutral wires, and lightning-protective equipment shall all be attached to a common ground wire.

19. Miscellaneous.

Sufficient safe, cool, drinking water and an adequate first-aid kit must be provided on every work truck. Adequate safety equipment and construction tools for the workmen shall be provided by the Contractor.

PART IV. CONSTRUCTION DRAWINGS

The Construction Drawings for this Project are attached and follow.

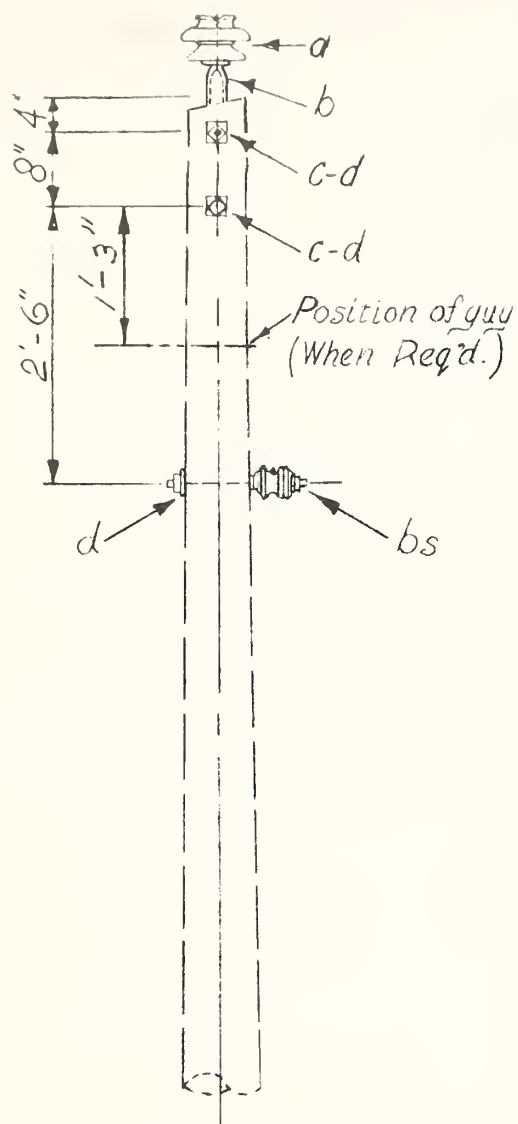


NOTE:

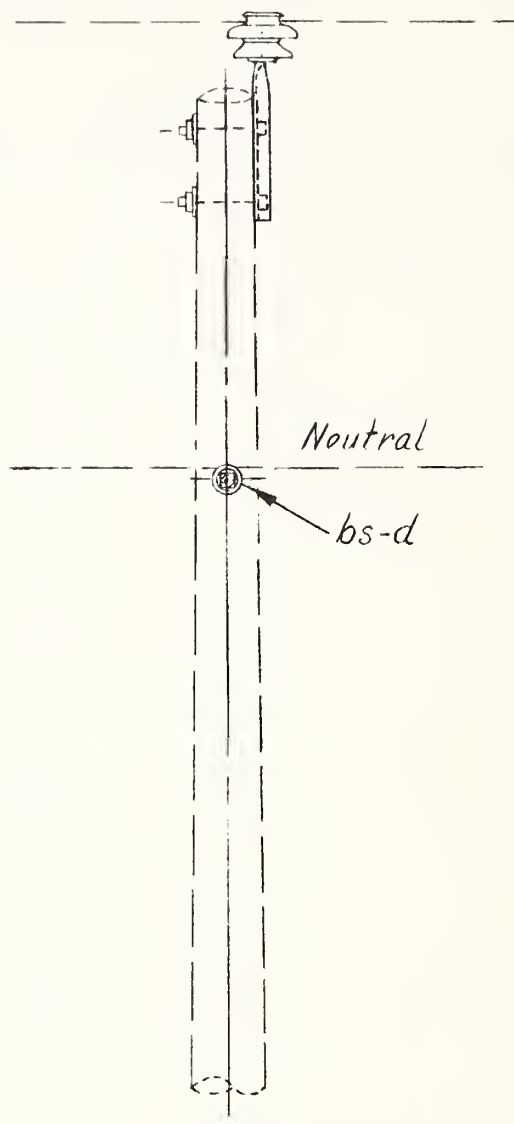
Locknuts, item "ek" shall be installed on all bolts as illustrated above. Although not now included in the material list of the Construction Contract drawings, it is required that this extra item shall be supplied, and installed in the quantities listed below.

ITEM	NO. REQ'D. EACH BOLT	ITEM	NO. REQ'D. EACH BOLT
Machine bolts	1	Clevis bolts	1
Carriage bolts	1	Single upset bolts	1
Eye bolts	1	Double upset bolts	1
Double arm bolts	4	Thimble eye bolts	1

		LOCKNUT ASSEMBLY GUIDE	
		Scale: $\frac{3}{8}"=1'-0"$	Date: Dec. 6, 1948
No.	REVISION	DATE:	A O



ELEVATION



SIDE ELEVATION

ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
a	1	Insulator, pin type	d	3	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole
b	1	Pin, pole top, 20"	bs	1	Bolt, single upset, insulated
c	2	Bolt, machine, 5/8" x req'd. Length			

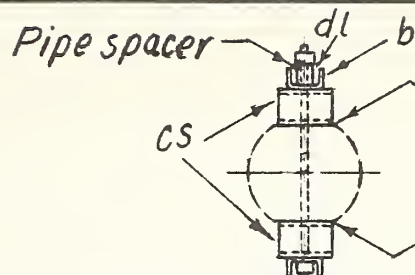
14-4/49/11 PRIMARY, 1-PHASE 2-WIRE, NEUTRAL GROUNDED
VERTICAL CONSTR.-0° TO 5° ANGLE-SINGLE PRIMARY SUPPORT.

Scale 1/2" = 1'-0"

Date: June 3, '49

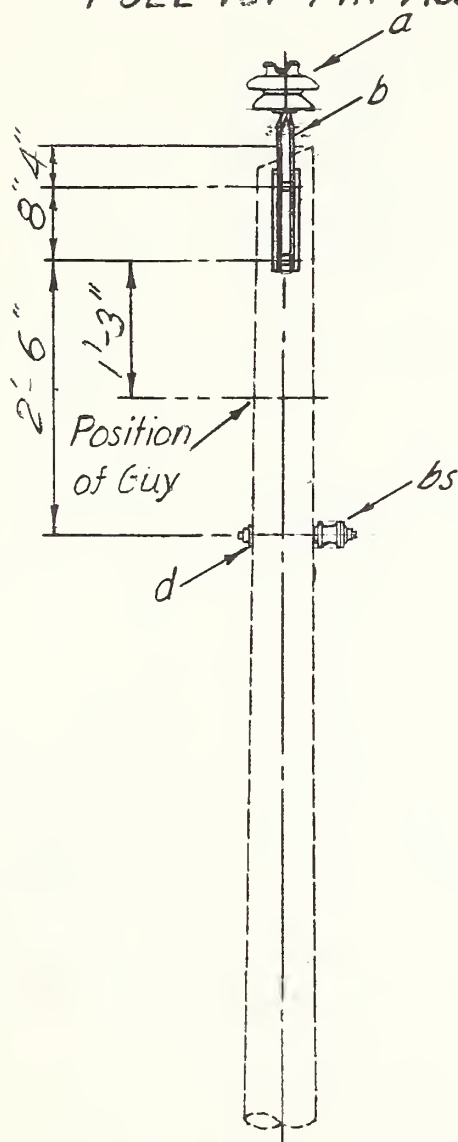
1	Minor changes	8-24-49
NO.	REVISION	DATE:

VAIR

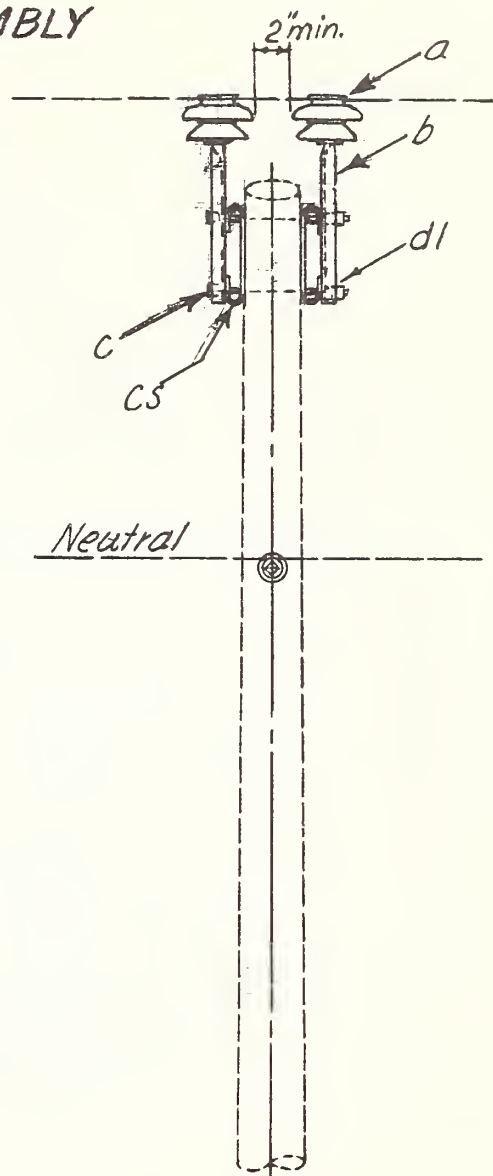


Pole to be gained on both sides, to provide flat surfaces for brackets.

POLE TOP PIN ASSEMBLY

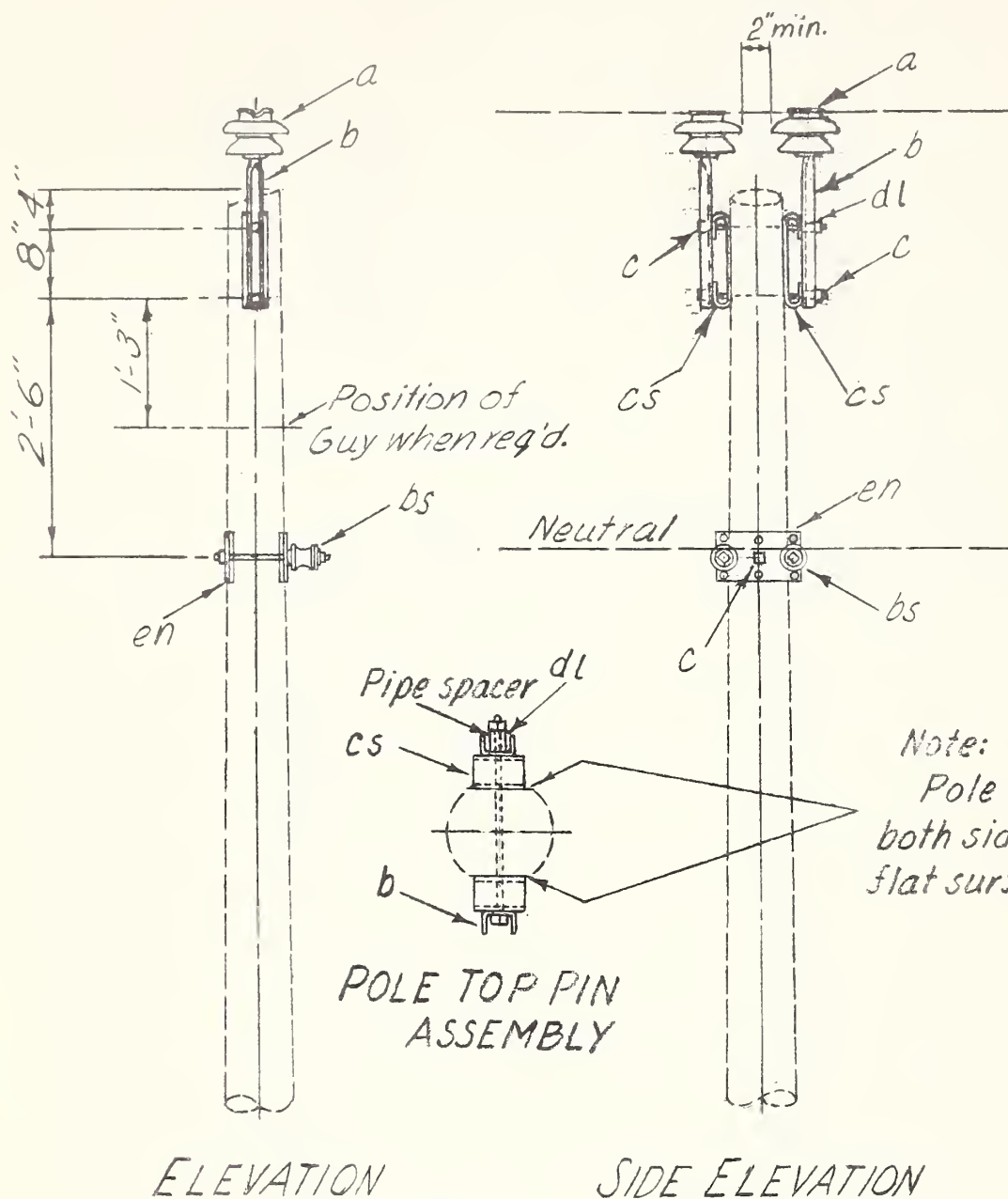


ELEVATION

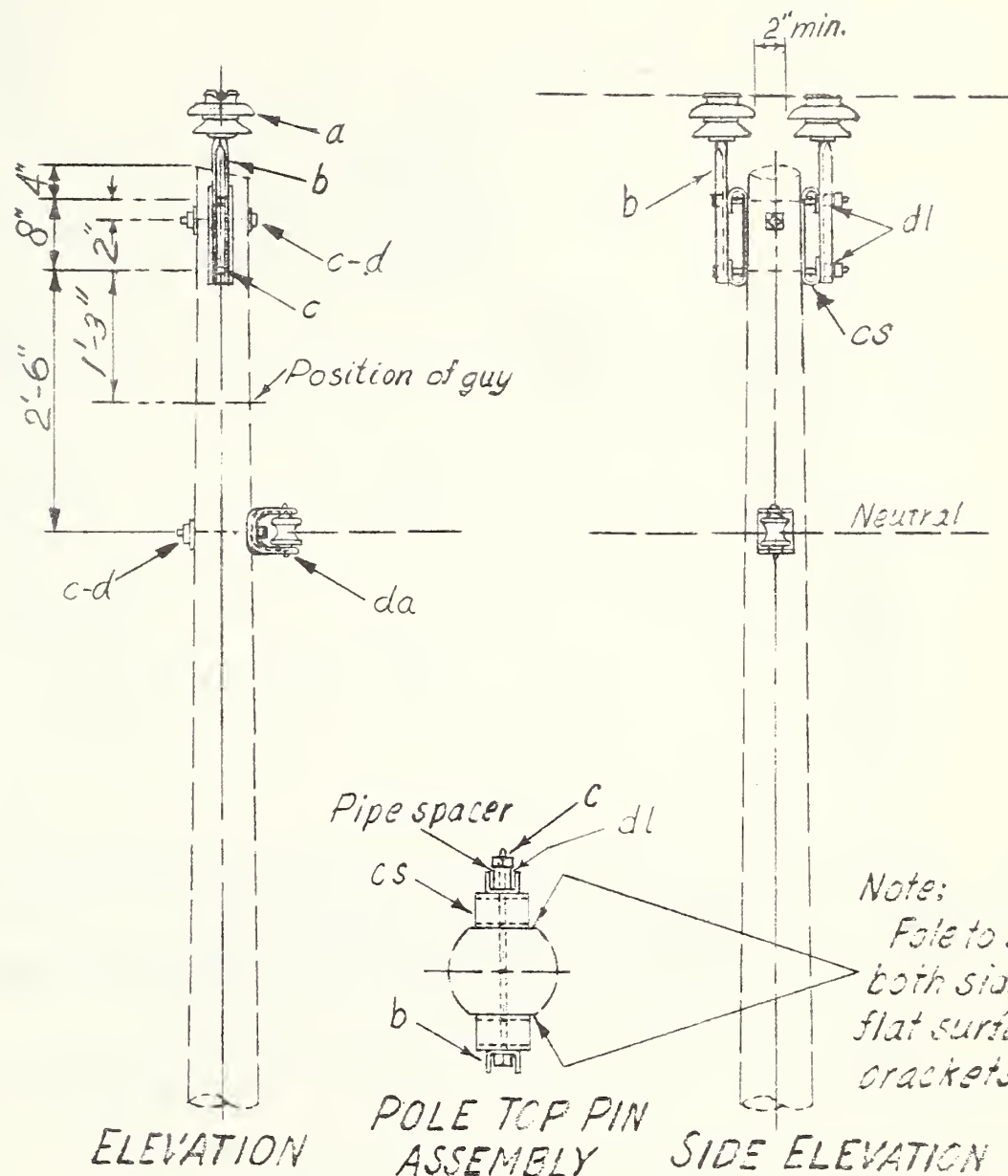


SIDE ELEVATION

ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
a	2	Insulator, pin type	d	1	Washer, 2 1/4" x 2 1/4" x 3/16", 3/16" hole
b	2	Pin, pole top, 20"	bs	1	Bolt, single upset, insulated
c	2	Bolt, machine, 1/8" x reqd. lgth.	cs	2	Bracket, pole top, 1/4" x 3"
dl	2	Pipe spacer, 3/4" dia. x 1 1/2"			
			14.4/24.9 KV. PRIMARY, 1-PHASE 2-WIRE, NEUTRAL GROUND		
			VERTICAL CONSTR.-0° TO 5° ANGLE, DOUBLE PRIMARY SUPPORT		
2	Minor changes	B-24-51	Scale: 1/2"=1'-0"		Date: Oct. 5, 1949
1	Minor changes and additions	3-14-51			VAI-IRI
NO.	REVISION	DATE:			



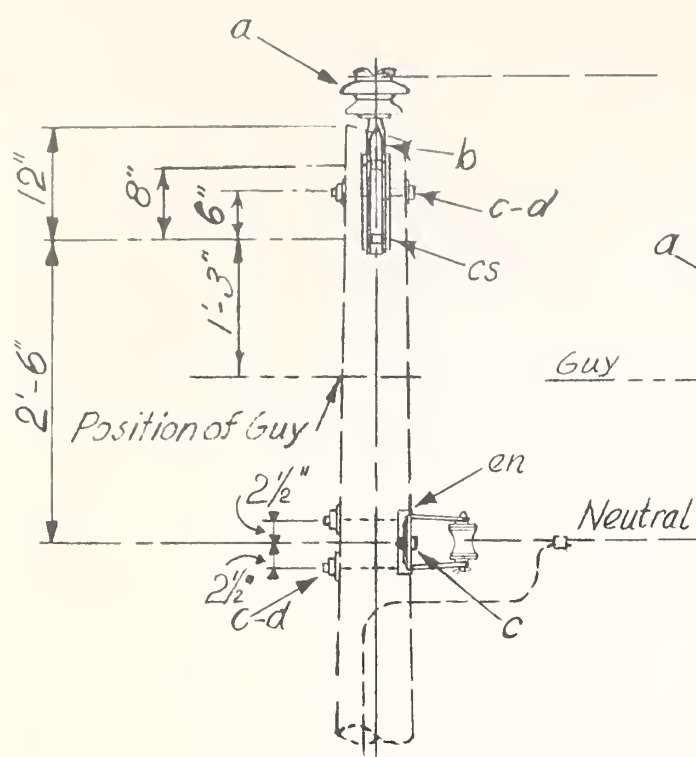
ITEM	NO. REQD	MATERIAL	ITEM	NO. REQD	MATERIAL
a	2	Insulator, pin type	bs	2	Bolt, single upset, insulated
b	2	Pin, pole top, 20"	cs	2	Bracket, pole top, 1/4"x3"
c	3	Bolt, machine, 5/8"x regd. lenth.	en	2	Plate, double support
d	2	Washer, 2 1/4"x2 1/4"x 3/16, 3/16 hole	dl	2	Pipe spacer, pole pin, 3/4" dia. x 1 1/2"
2 Minor changes 1 Minor changes and additions No. REVISION			14.4/24.9 KV. PRIMARY, 1-PHASE, 2-WIRE NEUTRAL GROUNDED VERTICAL CONSTRUCTION 0° TO 5° ANGLE DOUBLE PRIMARY AND NEUTRAL SUPPORTS		
			Scale: 1/2"=1'-0" Date: Oct. 7, 1949 VAI-2R		



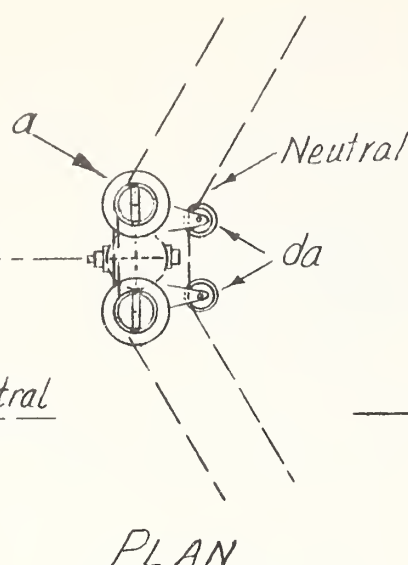
NOTE:- When the transverse load is more than 500 pounds per pin, refer to VA9

ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
a	2	Insulator, pin type	d	3	Washer, 2 1/4" x 2 1/4" x 7/16", 1 1/16" hole
b	2	Pin, pole top, 20"	CS	2	Bracket, pole top, 1/4" x 3"
c	4	Bolt, machine, 5/8" x req'd. length	da	1	Bracket, insulated
dl	2	Pipe spacer, pole pin, 3/4" dia. x 1 1/2"			
			14.4/24.9 KV PRIMARY, 1-PHASE 2-WIRE, NEUTRAL GROUNDED - VERTICAL CONSTR. - 5° TO 30° ANGLE.		
2	Minor changes	8-24-51	Scale: 1/2" = 1'-0"		Date: June 3, '49
1	Replace bracket	12-23-49			VA2R
No.	REVISION	DATE			

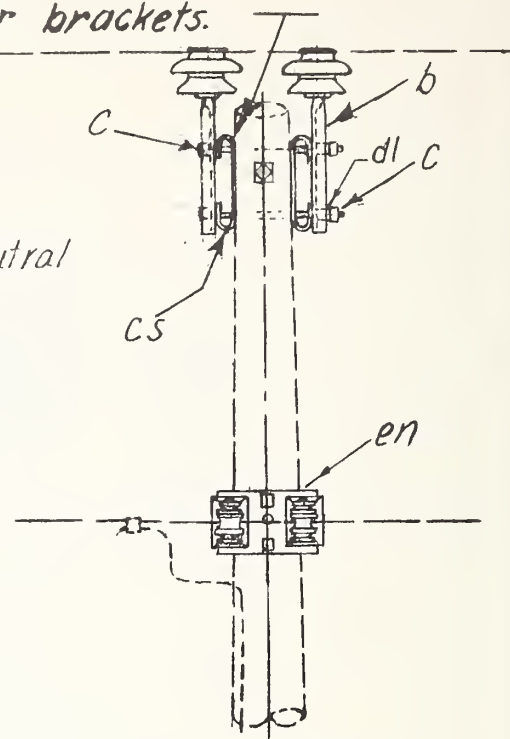
Pole to be galvanized on both sides, to provide flat surfaces for brackets.



ELEVATION



PLAN



SIDE ELEVATION

NOTES:

When the transverse load is more than 500 pounds per pin, substitute crossarm construction similar to C2-1R or C2-2R as required.

Neutral may be installed on the opposite side of the pole as required to avoid conductor crossings.

This construction may also be used for the middle phase on three phase assemblies.

Insulators should be for 33 KV. at crossings.

ITEM	No. Req'd.	MATERIAL	ITEM	No. Req'd.	MATERIAL
a	2	Insulator, pin type			
b	2	Pin, pole top, 20"	cs	2	Bracket, pole top, 1/4"x3"
c	7	Bolt, machine, 5/8"x req'd. length	da	2	Bracket, insulated
d	4	Washer, 2 1/4"x 2 1/4"x 3/16", 3/16" hole	dl	2	Pipe spacer, pole pin, 3/4" dia. x 1 1/2"
			en	1	Plate, double support

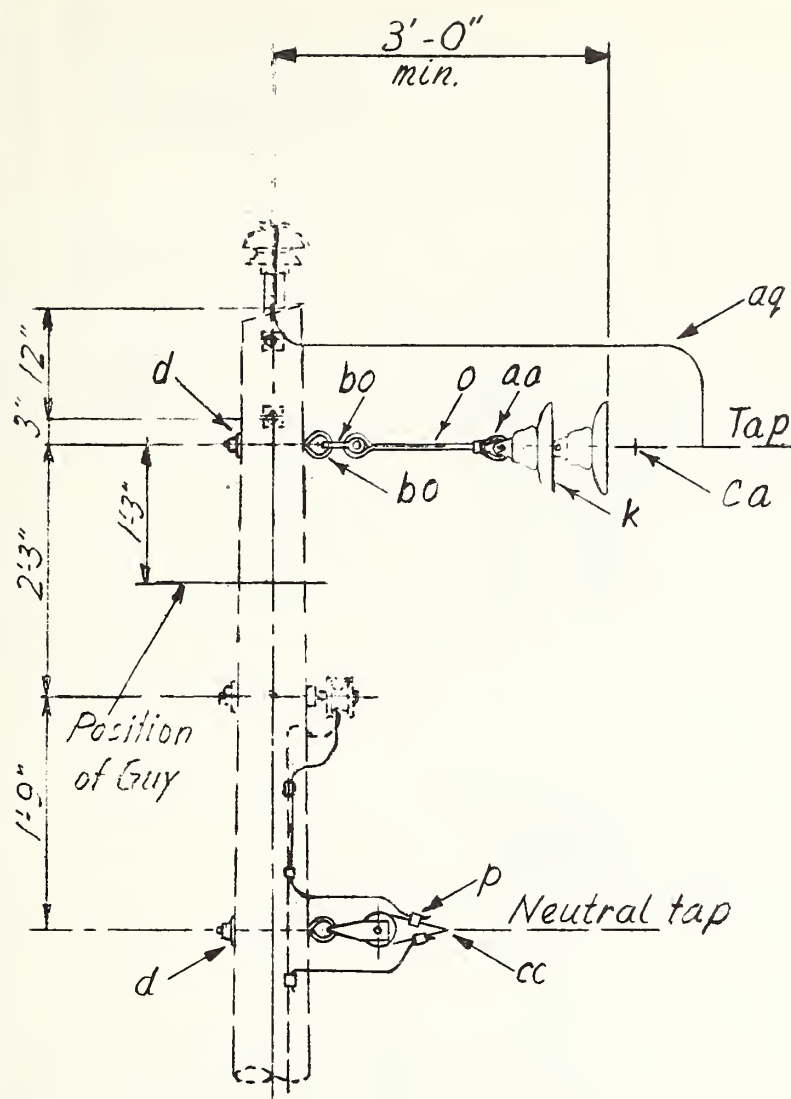
14.4/24.9KV. PRIMARY, 1-PHASE 2-WIRE, NEUTRAL GROUNDED
VERTICAL CONSTRUCTION - 0° TO 30° ANGLE
DOUBLE PRIMARY AND NEUTRAL SUPPORT

Scale: 1/2" = 1'-0"

Date: June 14, '49

2	Minor changes	8-24-51
1	Replace bracket	12-22-49
No.	REVISION	Date:

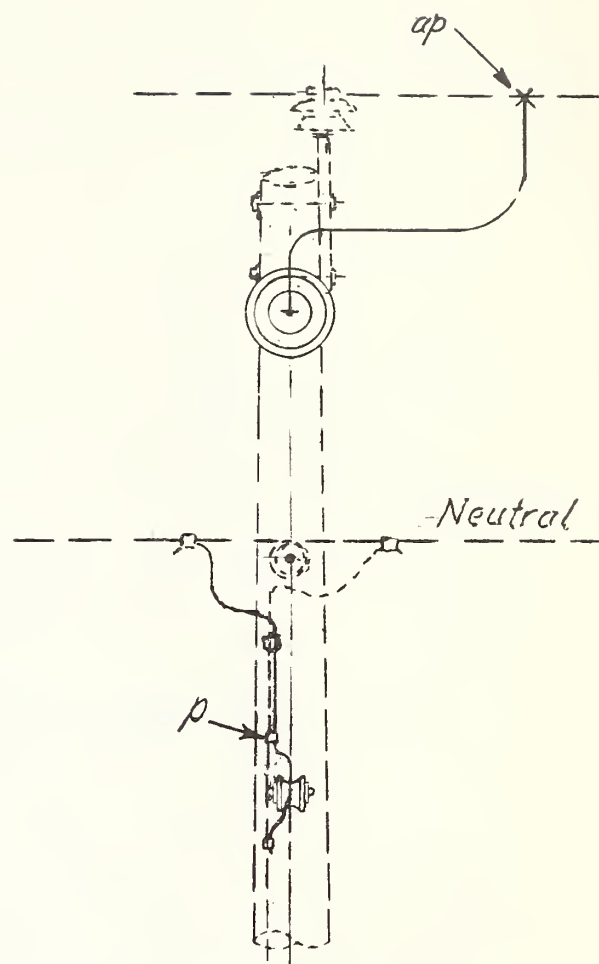
VA2-1R



ELEVATION

NOTE:

The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.



SIDE ELEVATION

ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
d	2	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	ap	1	Clamp, hot line, tap assembly
k	2	Insulator, suspension, 10"	aq		Jumpers
			bo	1	Shackle, anchor
o	3	Bolt, eye, 5/8" x req'd. length	ca	1	Deadend assembly, primary
p		Connectors, as req'd.	cc	1	Deadend assembly, neutral
aa	1	Nut, eye, 5/8"			

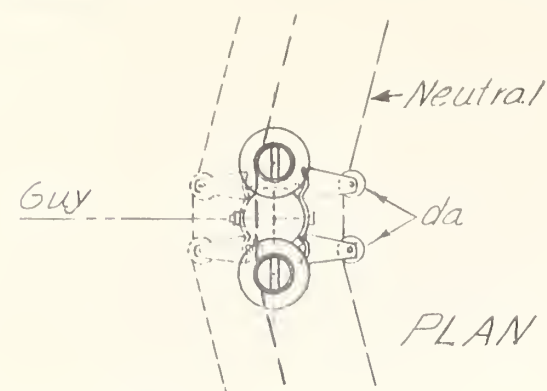
14.4/24.9KV. PRIMARY, 1-PHASE 2-WIRE NEUTRAL GROUNDED
VERTICAL CONSTRUCTION - TAP AT 0° TO 30° ANGLE

Scale: 1/2" = 1'-0"

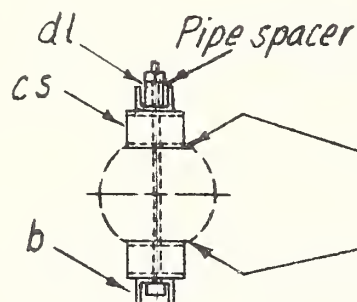
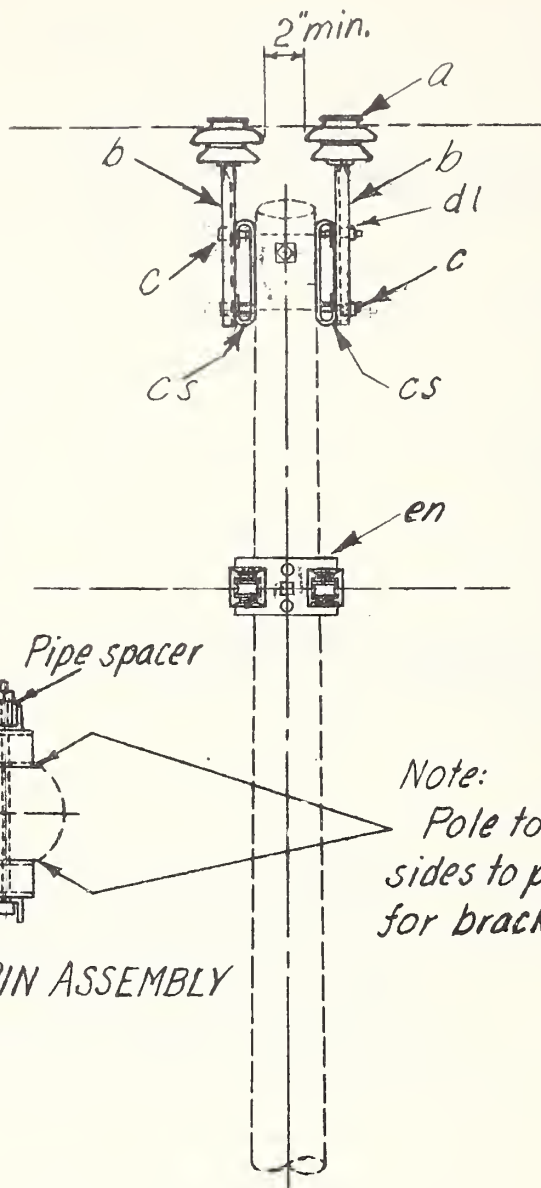
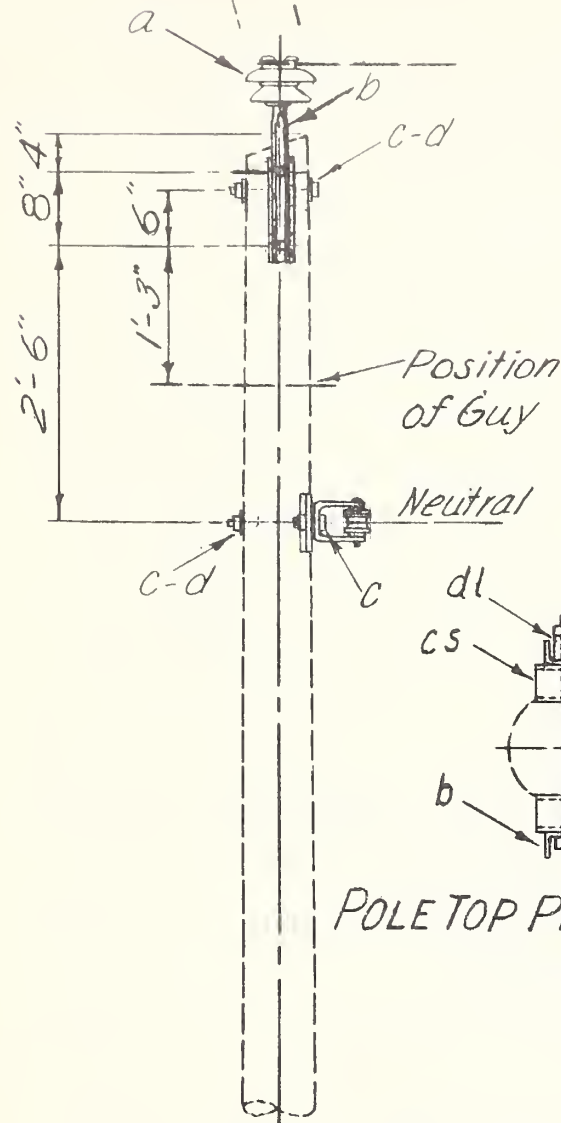
Date: June 15, 49

1	Minor changes	7-31-53
No.	REVISION	Date:

VA2-2R



Note:
When the transverse load is more than 500 pounds per pin, crossarm construction similar to VA9 is recommended.



POLE TOP PIN ASSEMBLY

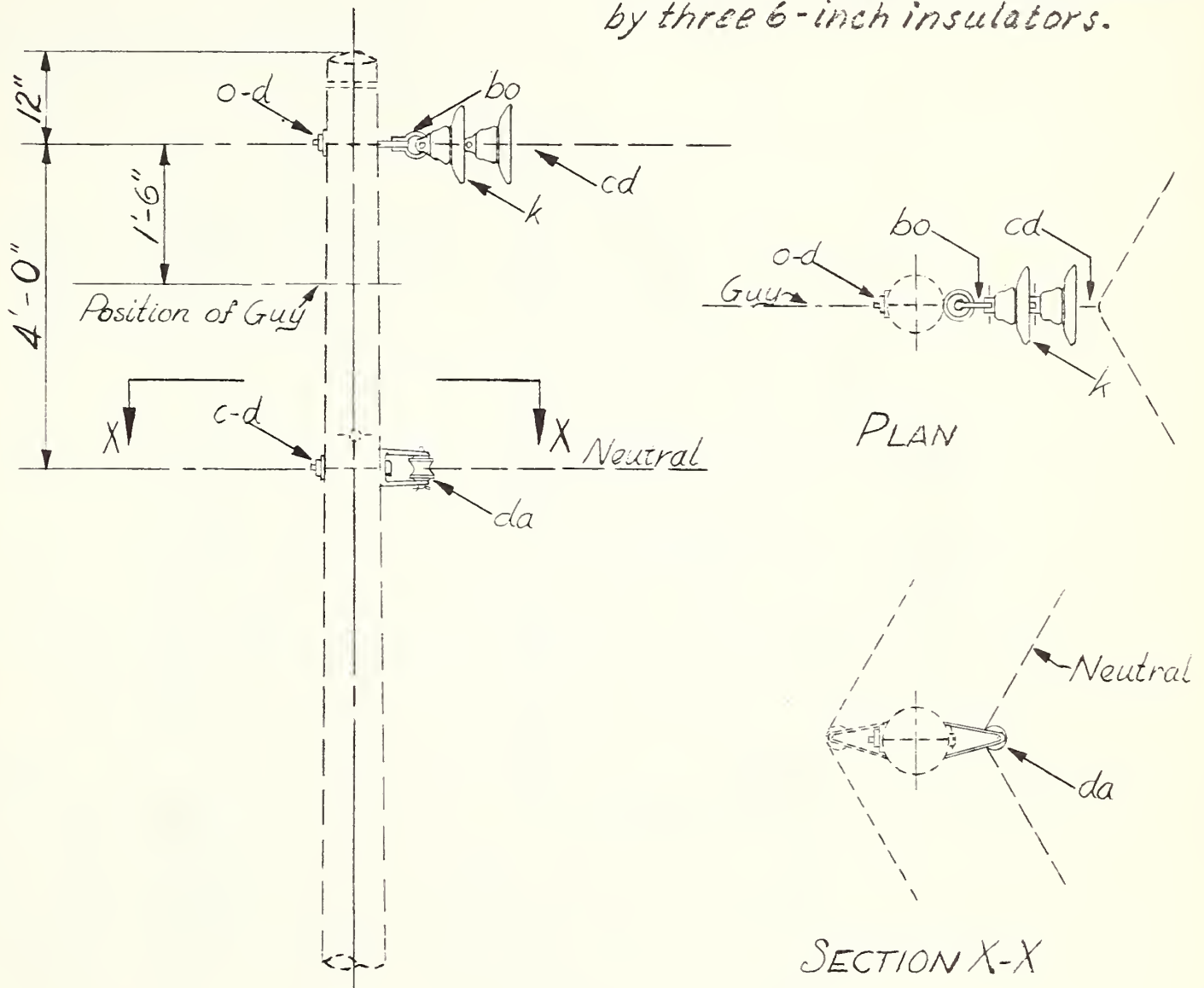
Note:
Pole to be galvanized on both sides to provide flat surfaces for brackets.

ELEVATION

SIDE ELEVATION

ITEM	NO. REQ'D	MATERIAL	ITEM	NO. REQ'D	MATERIAL
a	2	Insulator, pin type	cs	2	Bracket, pole top, 1/4" x 3"
b	2	Pin, pole top, 20"	da	2	Bracket, insulated
c	6	Bolt, machine, 5/8" x reg'd. length	en	1	Plate, double support
d	3	Washer, 2 1/4" x 2 1/4" x 3/16", 1 1/2" hole	dl	2	Pipe spacer, pole pin, 3/4" dia. x 1 1/2"
14.4/24.9KV. PRIMARY, 1-PHASE, 2-WIRE, NEUTRAL GROUNDED VERTICAL CONSTRUCTION-5° TO 30° ANGLE DOUBLE PRIMARY AND NEUTRAL SUPPORTS					
2	Minor changes	8/24/51	Scale: 1/2" = 1'-0"		Date: Oct. 10, 1949
1	Minor changes and additions	2/24/51			VA2-3R
No.	REVISION	DATE:			

NOTE:
The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.



ITEM	No. REQ'd	MATERIAL	ITEM	No. REQ'd	MATERIAL
c	1	Bolt, machine, $\frac{5}{8}$ " x reg'd. length	bo	1	Shackle, anchor
d	2	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{16}$ " hole	cd	1	Angle assembly, primary
k	2	Insulator, suspension, 10"	da	1	Bracket, insulated
o	1	Bolt, eye, $\frac{5}{8}$ " x reg'd. length			

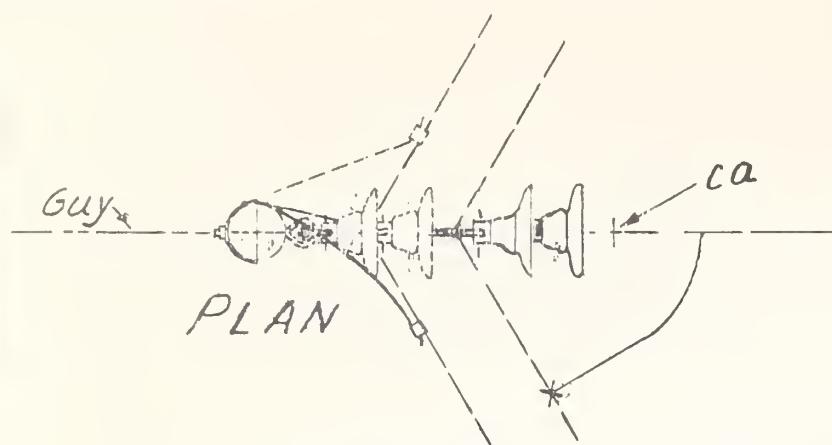
14.4/24.9 KV. PRIMARY, 1-PHASE 2-WIRE, NEUTRAL
GROUNDED-VERTICAL CONSTRUCTION-30° TO 60° ANGLE

Scale: $\frac{1}{2}$ " = 1'-0"

Date: June 8, 1971

No. REVISION DATE:

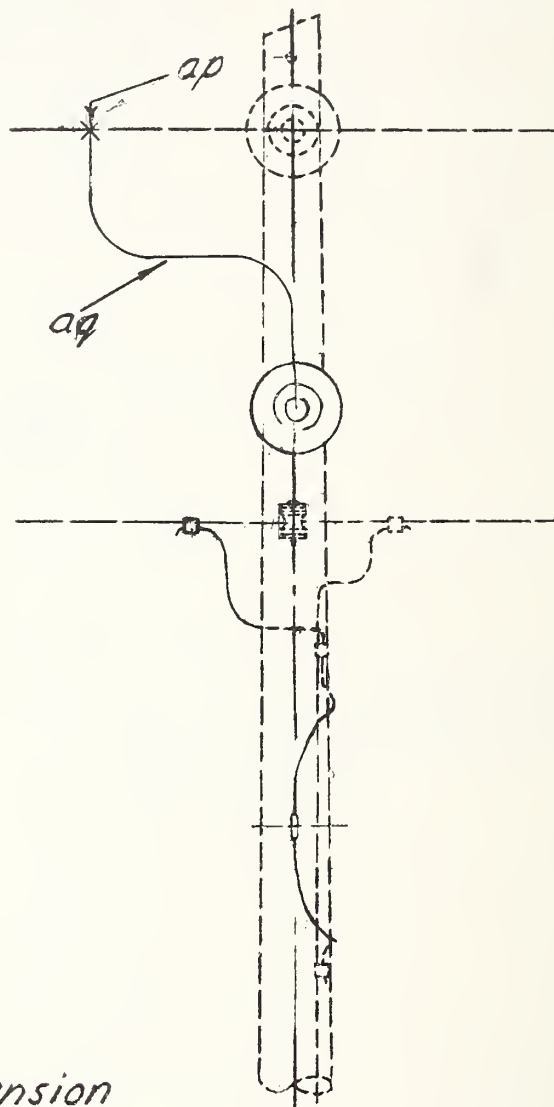
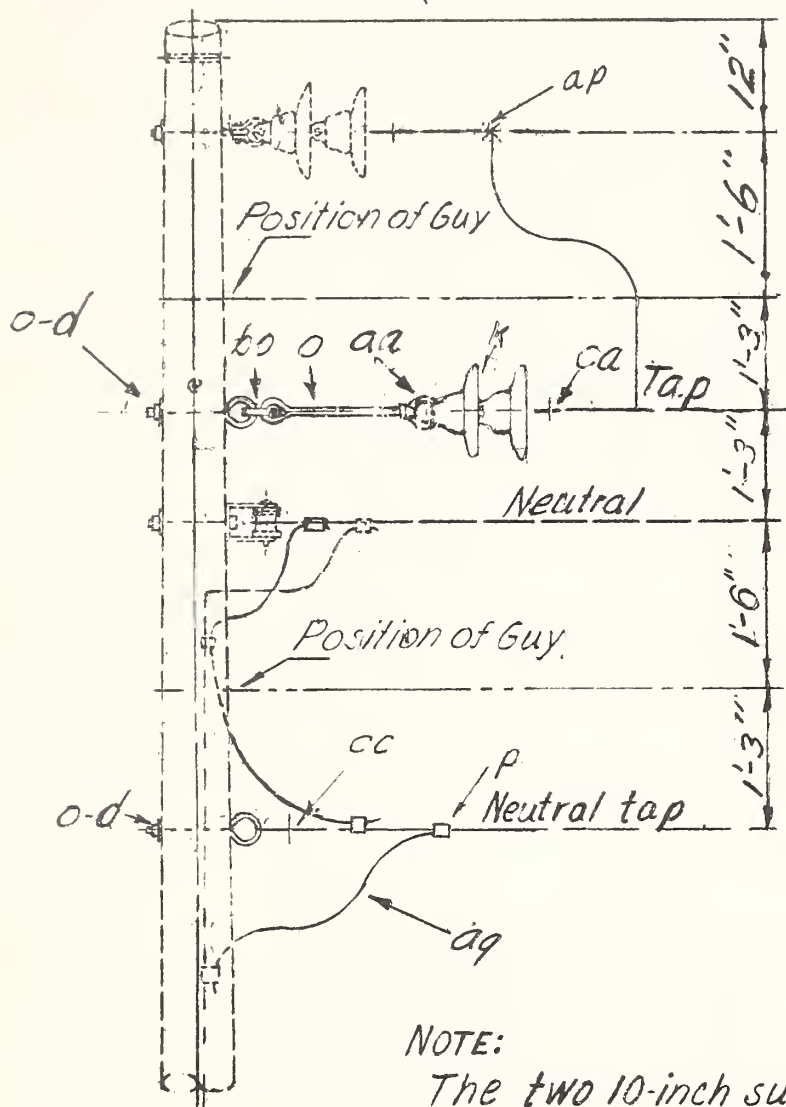
VA 3



NOTE:

A similar arrangement may be used for taps at 60° to 90°.

When the line may be energized from either end, hot line clamps should be installed on both ends of the jumper.



NOTE:

The two 10-inch suspension insulators shown may be replaced by three 6" insulators.

ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
d	2	Washer, 2 1/4" x 2 1/4" x 3/16", 3/4" hole	ap	1	Clamp, hot line, tap assembly
k	2	Insulator, suspension, 10"	aq		Jumpers and leads, as req'd.
			bo	1	Shackle, anchor
o	3	Bolt, eye, 7/8" x req'd. length	ca	1	Deadend assembly, primary
p		Connectors, as required	cc	1	Deadend assembly, neutral
aa	1	Nut, eye, 7/8"			

14.4/24.9KV. PRIMARY, 1-PHASE 2-WIRE, NEUTRAL GROUND
VERTICAL CONSTRUCTION-TAP AT 30° TO 60° ANGLE
(INSIDE OF ANGLE)

Scale: 1/2" = 1'-0"

Date: Sept. 2, 1949

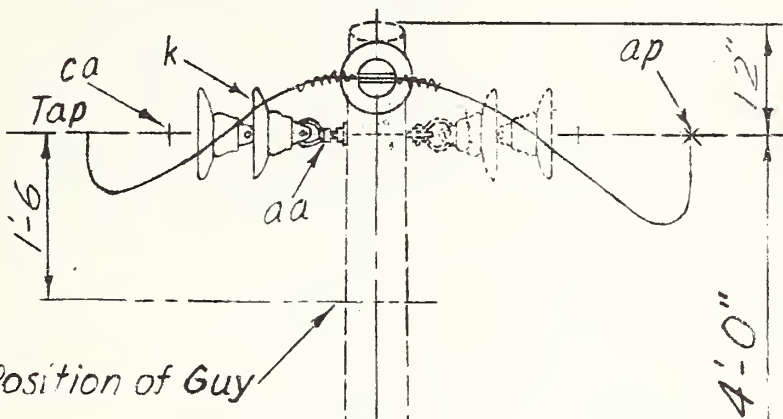
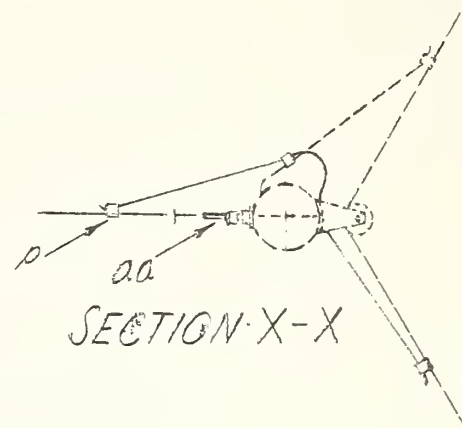
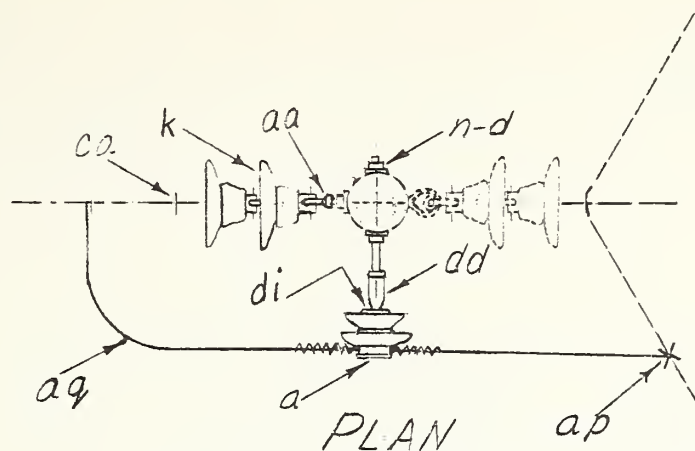
1 Minor changes

B-24-JT

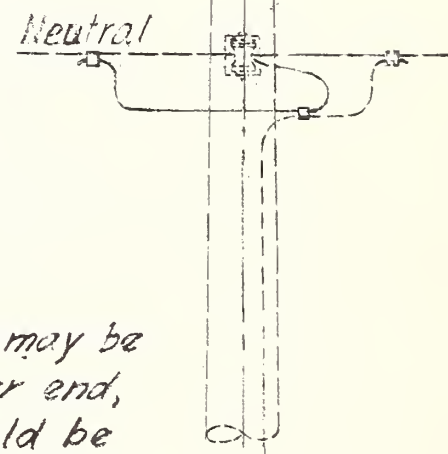
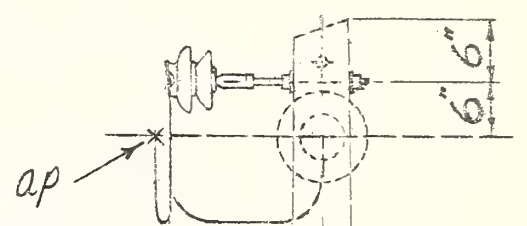
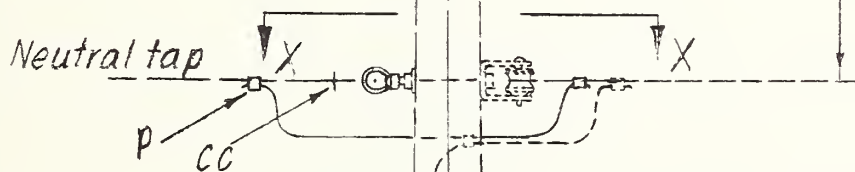
No. REVISION

DATE:

VA3-3R



Position of Guy



NOTE:

The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.

Note: When the line may be energized from either end, hot line clamps should be installed on both ends of the jumper.

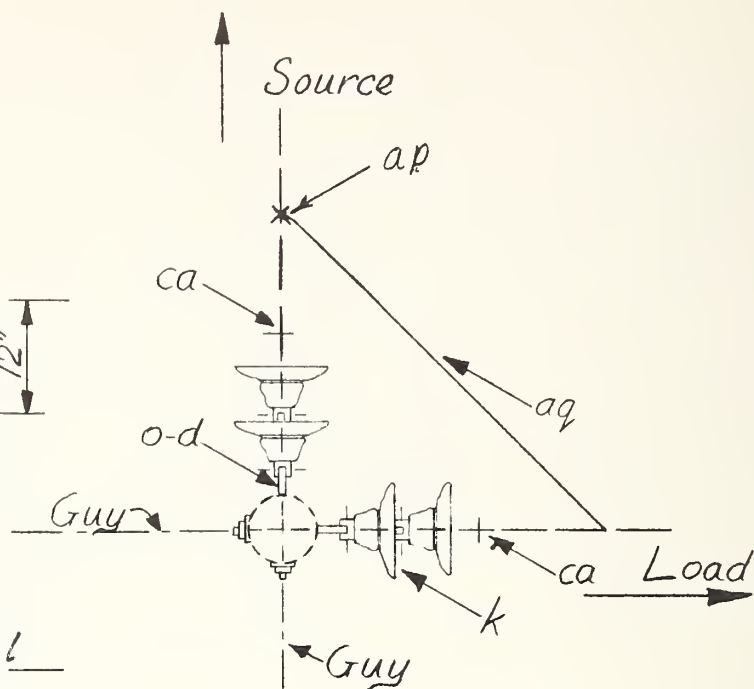
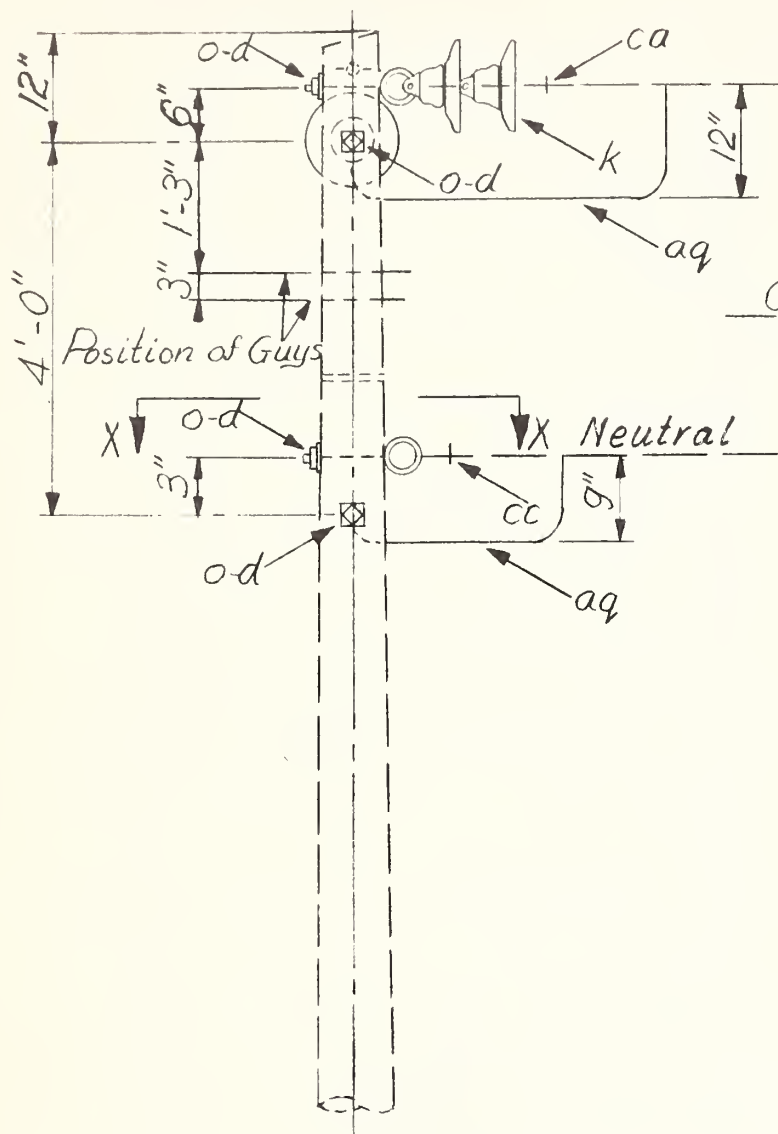
ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
a	1	Insulator, pin type	ap	1	Clamp, hot line, tap assembly
d	2	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	aq		Jumpers and leads, as reqd.
k	2	Insulator, suspension, 10"	aa	2	Nut, eye, 3/8"
n	1	Bolt, double arming, 3/8" x regd. lgth.	ca	1	Deadend assembly, primary
			cc	1	Deadend assembly, neutral
p		Connectors, as required.	dd	1	Adapter, insulator
			di	1	Adapter, thimble, 1 3/8" to 1"

14.4/24.9KV. PRIMARY, 1-PHASE 2-WIRE, NEUTRAL GROUND
VERTICAL CONSTRUCTION-TAP AT 30° TO 60° ANGLE
(OUTSIDE OF ANGLE)

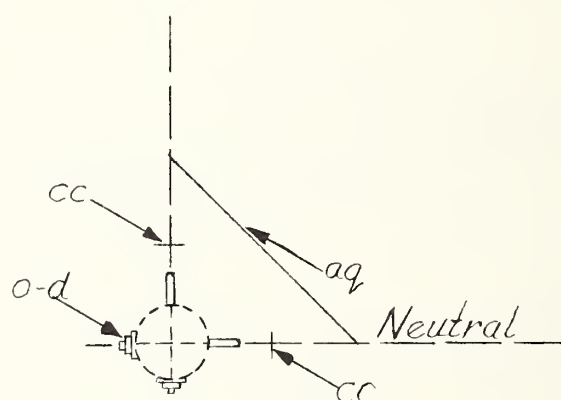
2	Minor changes	8-24-51	Scale: 1/2" = 1'-0"	Date: Oct. 13, 1949
1	Minor changes and additions	3-23-51		
No.	REVISION	DATE:		VA 3-4.91

NOTE:

The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.



PLAN



SECTION X-X

ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
d	4	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	ap	1	Clamp, hot line, top assembly
k	4	Insulator, suspension, 10"	aq		Jumpers
o	4	Bolt, eye, 5/8" x req'd. length	ca	2	Deadend assembly, primary
p		Connectors, as req'd	cc	2	Deadend assembly, neutral

14.4/24.9 KV. PRIMARY, 1-PHASE 2-WIRE, NEUTRAL
GROUNDED - VERTICAL CONSTRUCTION - 60° TO 90° ANGLE

Scale: 1/2" = 1'-0"

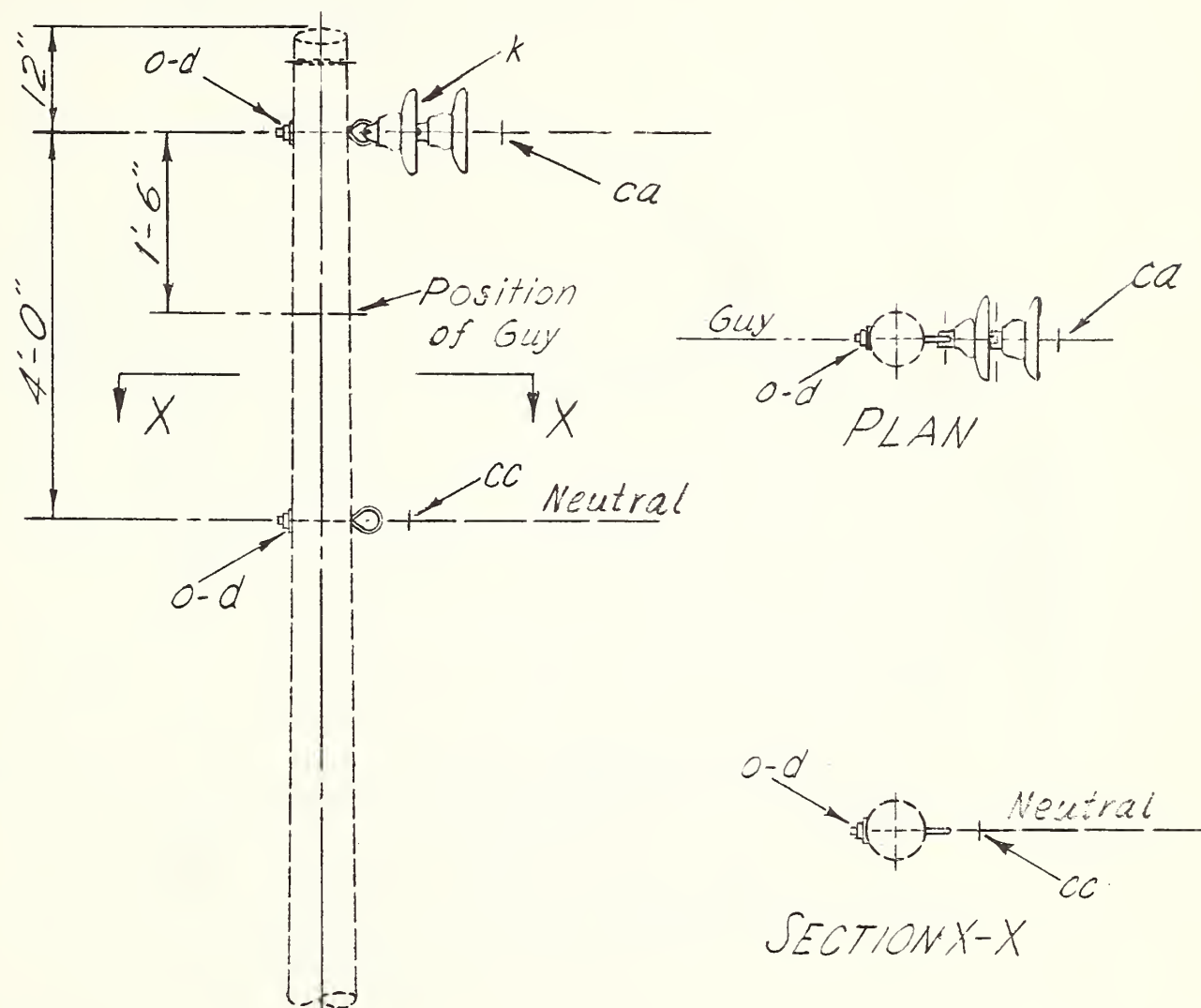
Date: June 8, '49

VA4

No. REVISION DATE:

NOTE:

The two 10 inch suspension insulators shown may be replaced by three 6-inch insulators.



ITEM	NO. REQD	MATERIAL	ITEM	NO. REQD	MATERIAL
d	2	Washer, 2 1/4" x 2 1/4" x 3/16", 1 1/2" hole	cc	1	Deadend assembly, neutral
k	2	Insulator, suspension, 10"			
o	2	Bolt, eye, 3/8" x req'd. length			
ca	1	Deadend assembly, primary			

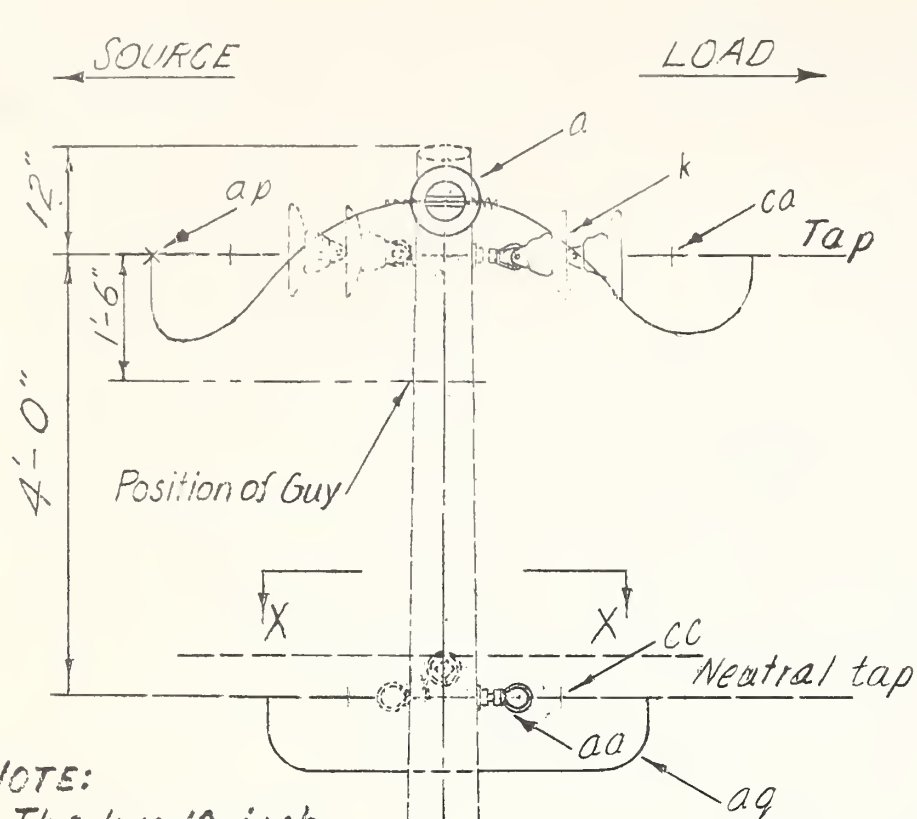
14.4/2-19 KV PRIMARY, 1-PHASE 2-WIRE NEUTRAL GROUND
VERTICAL CONSTRUCTION-DEADEND (SINGLE)

Scale: 1/2" = 1'-0"

Date: Oct. 14, 1949

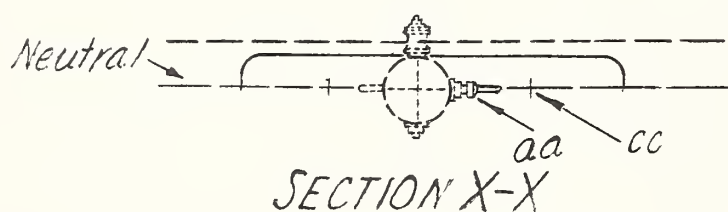
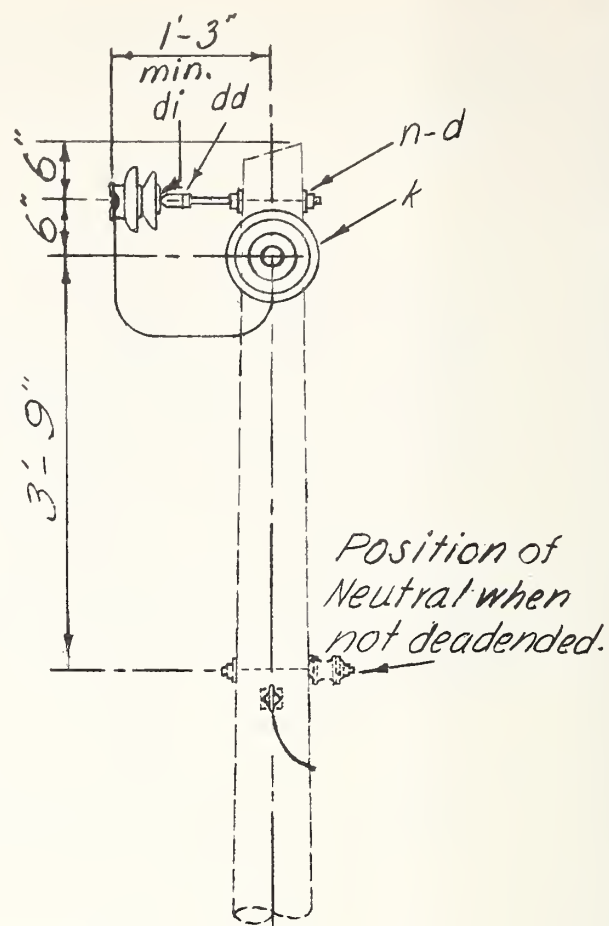
1	Minor changes and additions	8-24-51
NO.	REVISION	DATE:

V.A. 5-1



NOTE:

The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.



NOTE:

When the line may be energized from either end, hot line clamps should be installed on both ends of the jumper.

ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
a	1	Insulator, pin type	ap	1	Clamp, hot line, tap assembly
d	2	Washer, 2 1/4" x 2 1/4" x 3/16", 7/16" hole	aq		Jumpers and leads, as req'd.
k	2	Insulator, suspension, 10"	ca	1	Deadend assembly, neutral
n	1	Bolt, double arming, 7/8" x req'd. lenth.	cc	1	Deadend assembly, primary
p		Connectors, as required	dd	1	Adapter, insulator
aa	2	Nut, eye, 7/8"	di	1	Adapter, thimble, 1 3/8" to 1"

14.4/24.9KV. PRIMARY, 1-PHASE 2-WIRE, NEUTRAL GROUND
VERTICAL CONSTRUCTION-SINGLE PHASE TAP AT DEADEND

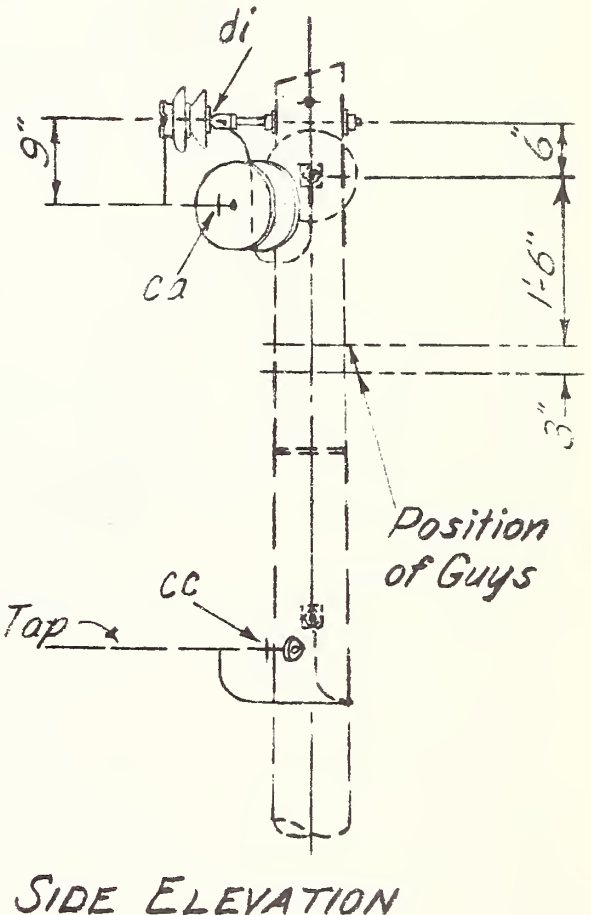
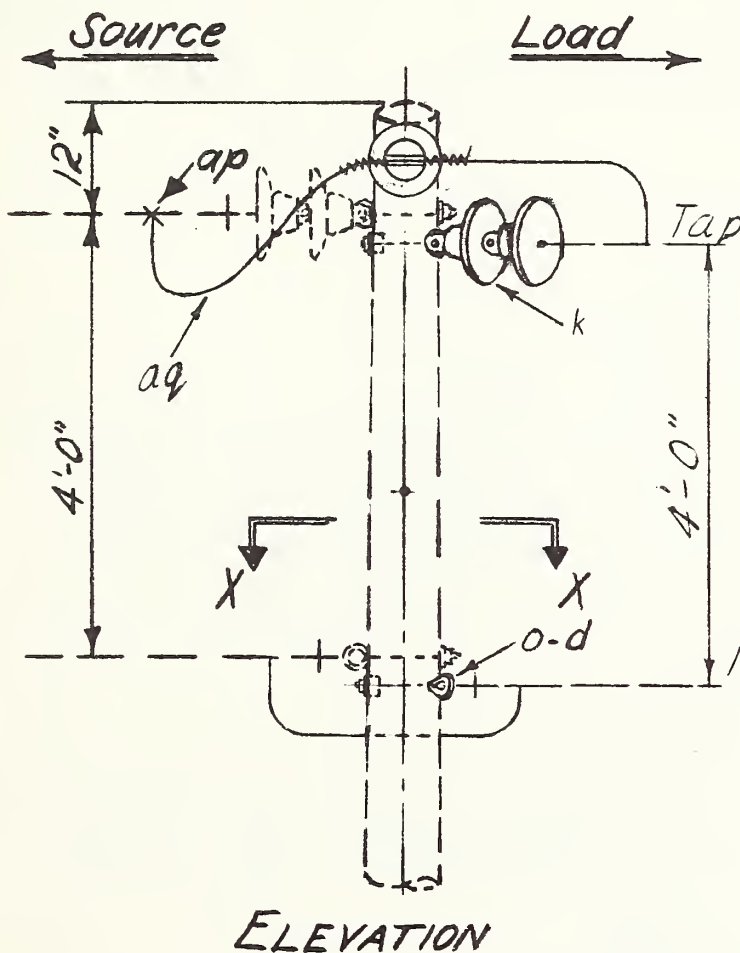
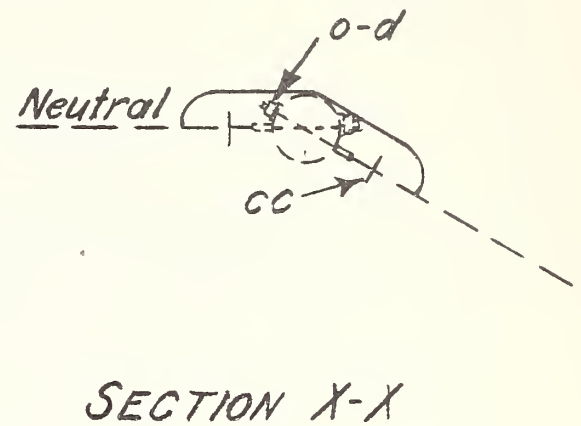
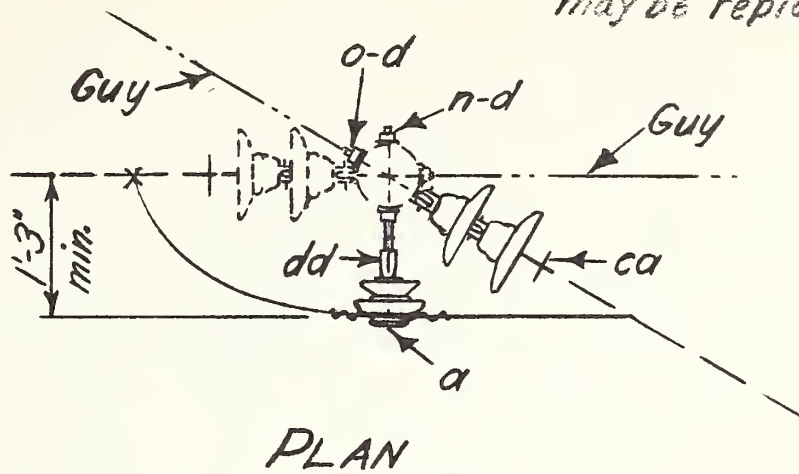
Scale: 1/2" = 1'-0"

1	Minor changes and additions	3-14-51
NO.	REVISION	DATE:

Date: Nov. 1, 1949

VA5-4R

NOTE: The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.



ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
a	1	Insulator, pin type	ap	1	Clamp, hot line, tap assembly
d	4	Washer, $2\frac{1}{4} \times 2\frac{1}{4} \times \frac{3}{16}$, $\frac{13}{16}$ hole	aq		Jumpers and leads, as req'd.
k	2	Insulator, suspension, 10"	ca	1	Deadend assembly, primary
n	1	Bolt, double arming, $\frac{5}{8}$ " x req'd. lgh.	cc	1	Deadend assembly, neutral
o	2	Bolt, eye, $\frac{5}{8}$ " x req'd. length	dd	1	Adapter, insulator
p		Connectors, as req'd.	di	1	Adapter, thimble, $1\frac{3}{8}$ " to 1"

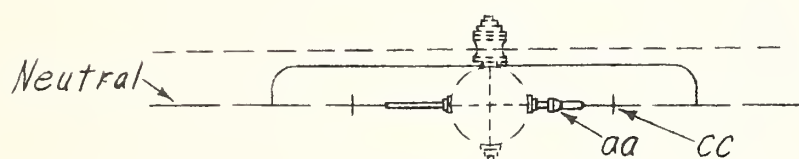
14.4/24.9KV. PRIMARY, 1-PHASE, 2-WIRE, NEUTRAL GROUNDED
VERTICAL CONSTRUCTION-5° TO 60° TAP AT DEADEND

Scale: $\frac{1}{2}$ " = 1'-0"

Date: Oct. 18, '49

1	Minor changes and additions	3/23/51
No.	REVISION	DATE

VA5-7R



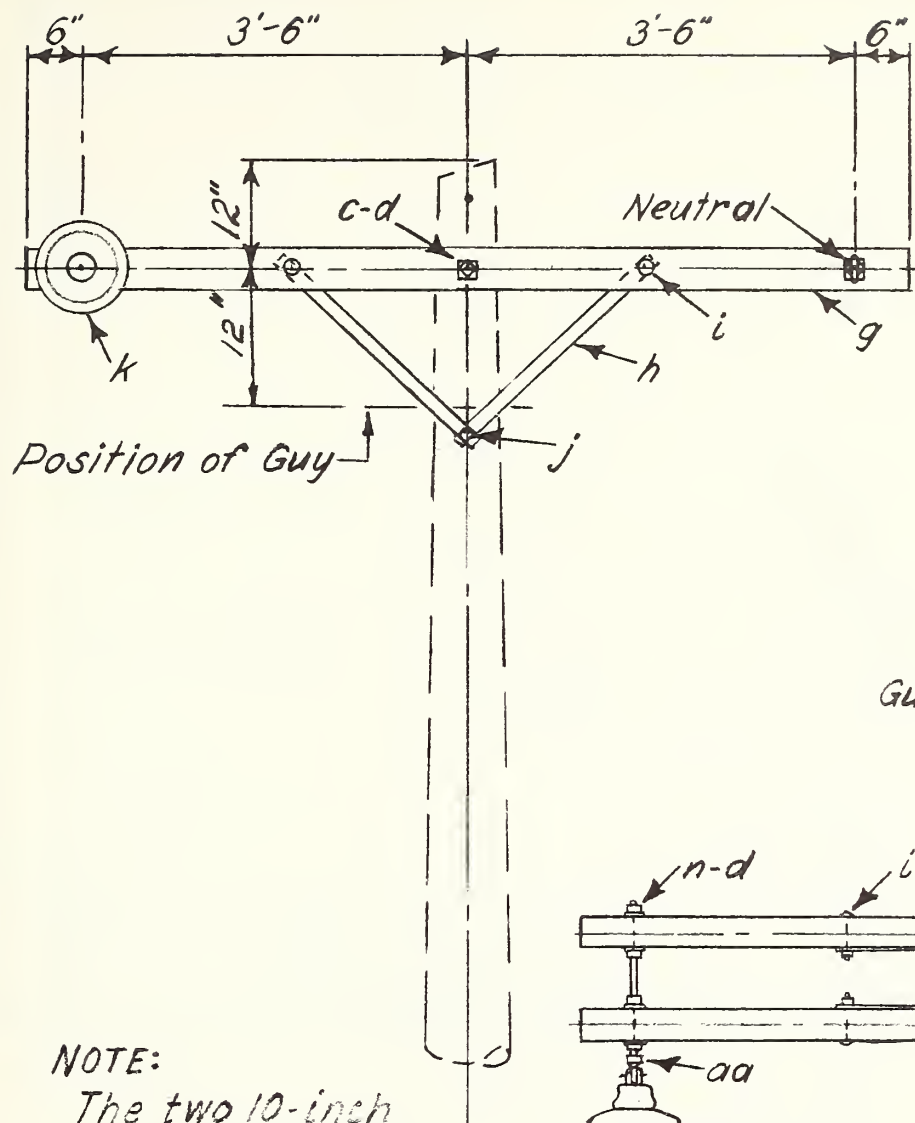
The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.

When the line may be energized from either end, hot line clamps should be installed on both ends of the jumper.

14.4/24.9 KV. PRIMARY, 1-PHASE, 2-WIRE, NEUTRAL GROUNDED
VERTICAL CONSTRUCTION-DEADEND (DOUBLE)

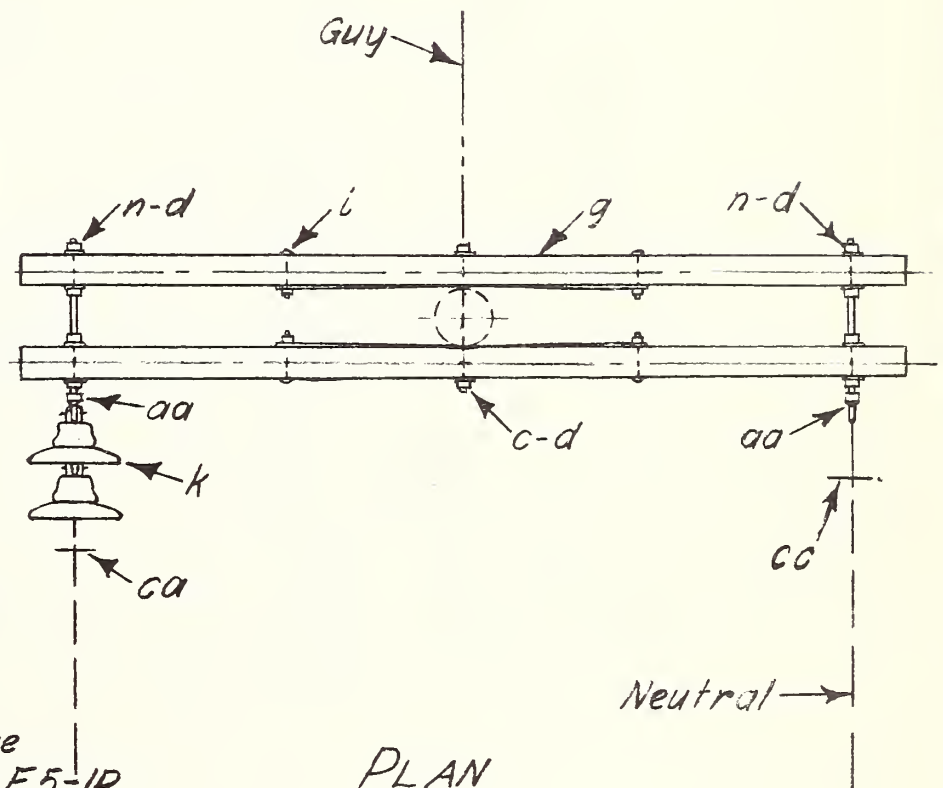
VA 6 R1

1	Substituted item dy for o	12-17-51
NO.	REVISION	DATE



NOTE:
The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.

Note:
When crossarm guys are required, refer to drawing E5-1R.



PLAN

ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
c	1	Bolt, machine, $\frac{5}{8}$ " x req'd. length	k	2	Insulator, suspension, 10"
d	10	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole	n	2	Bolt, double arming, $\frac{5}{8}$ " x req'd. l'th.
g	2	Crossarm, $3\frac{1}{2}$ " x $4\frac{1}{2}$ " x 8'-0"	aa	2	Nut, eye, $\frac{5}{8}$ "
h	4	Brace, flat, $1\frac{1}{4}$ " x $\frac{1}{4}$ " x 28"	ca	1	Deadend assembly, primary
i	4	Bolt, carriage, $\frac{3}{8}$ " x $4\frac{1}{2}$ "	cc	1	Deadend assembly, neutral
j	2	Screw, lag, $\frac{1}{2}$ " x 4"			

14. 4/249KV. PRIMARY, 1-PHASE, 2-WIRE, NEUTRAL GROUND
CROSSARM CONSTR.-DEADEND(SINGLE)

Scale: $\frac{1}{2}$ " = 1'-0"

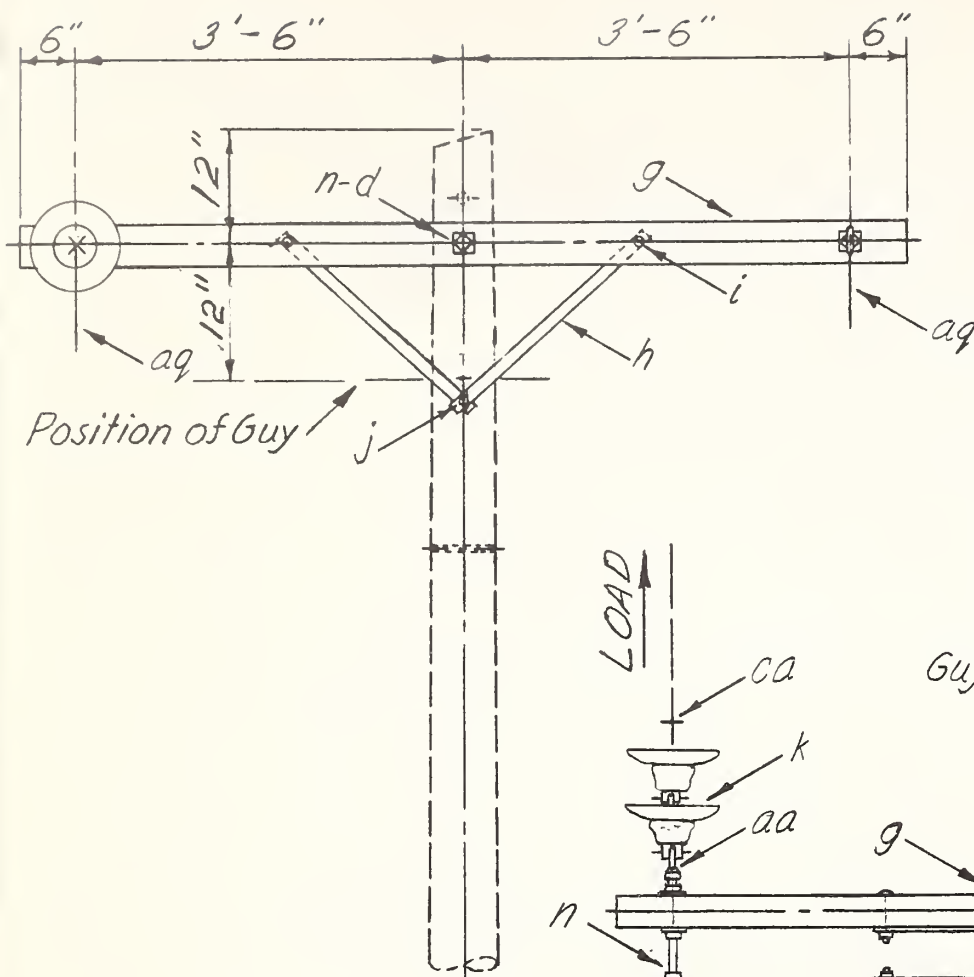
Date: Dec. 29, '49

No.	REVISION	DATE

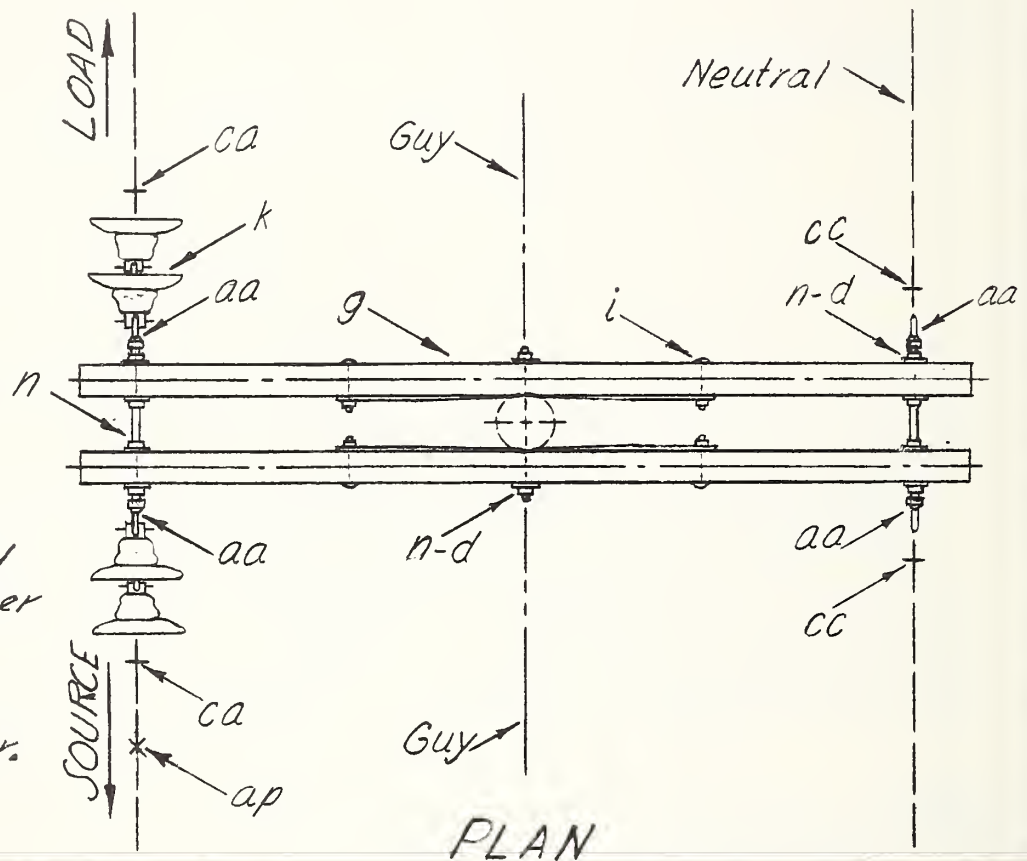
VA 7

NOTE:

The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.



Note: When the line may be energized from either end, hot line clamps should be installed on both ends of the jumper.



ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
d	10	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	p		Connectors, as required
g	2	Crossarm, 3 1/2" x 4 1/2" x 8'-0"	aa	4	Nut, eye, 5/8"
h	4	Brace, flat, 1 1/4" x 1/4" x 28"	ap	1	Clamp, hot line, tap assembly
i	4	Bolt, carriage, 3/8" x 4 1/2"	aq		Jumpers
j	2	Screw, lag, 1/2" x 4"	ca	2	Deadend assembly, primary
k	4	Insulator, suspension, 10"	cc	2	Deadend assembly, neutral
n	3	Bolt, double arming, 5/8" x req'd. lgth.			

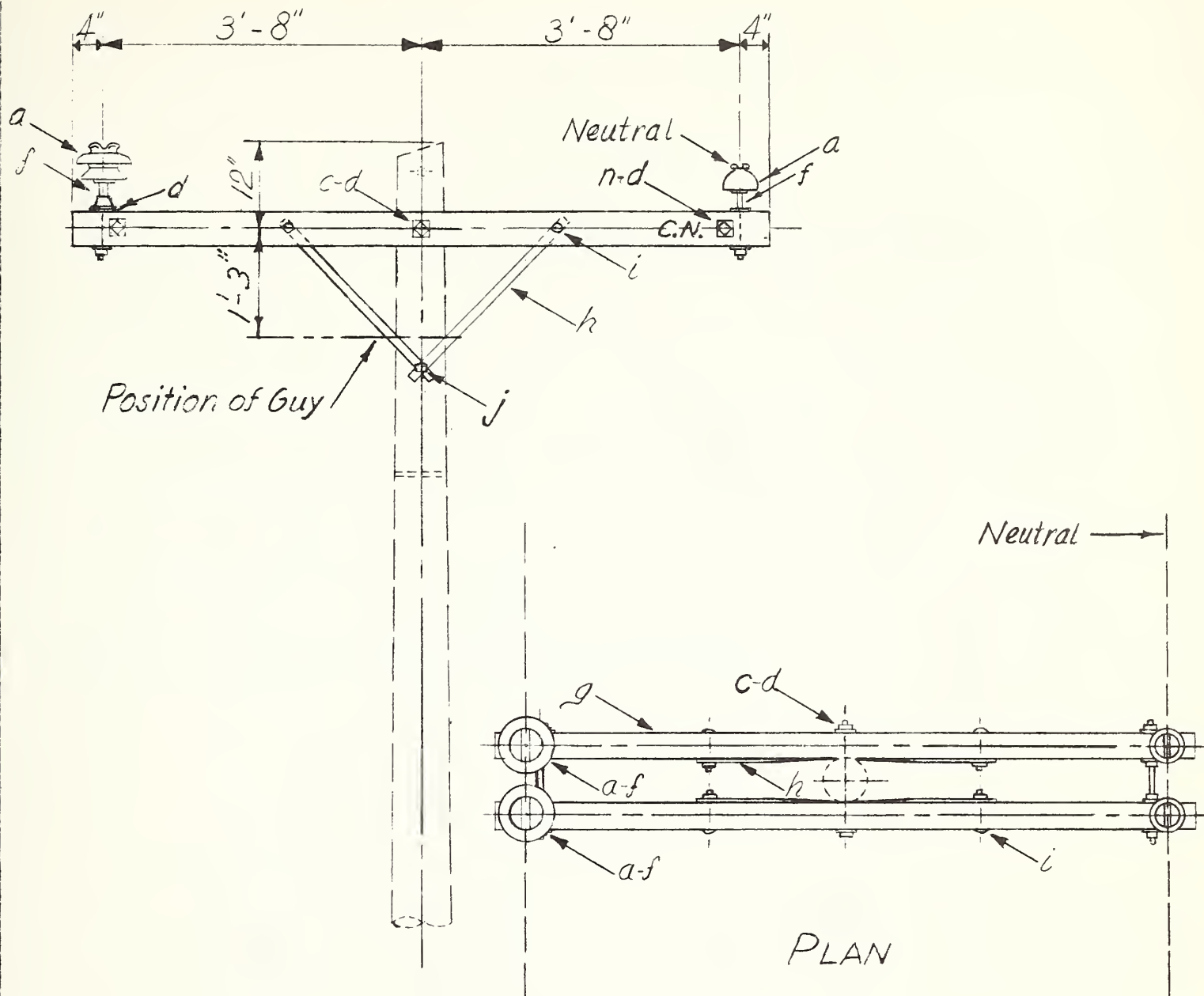
14.4/24.9KV. PRIMARY, 1-PHASE 2-WIRE, NEUTRAL GROUND
CROSSARM CONSTRUCTION - DEADEND (DOUBLE)

Scale: 1/2" = 1'-0"

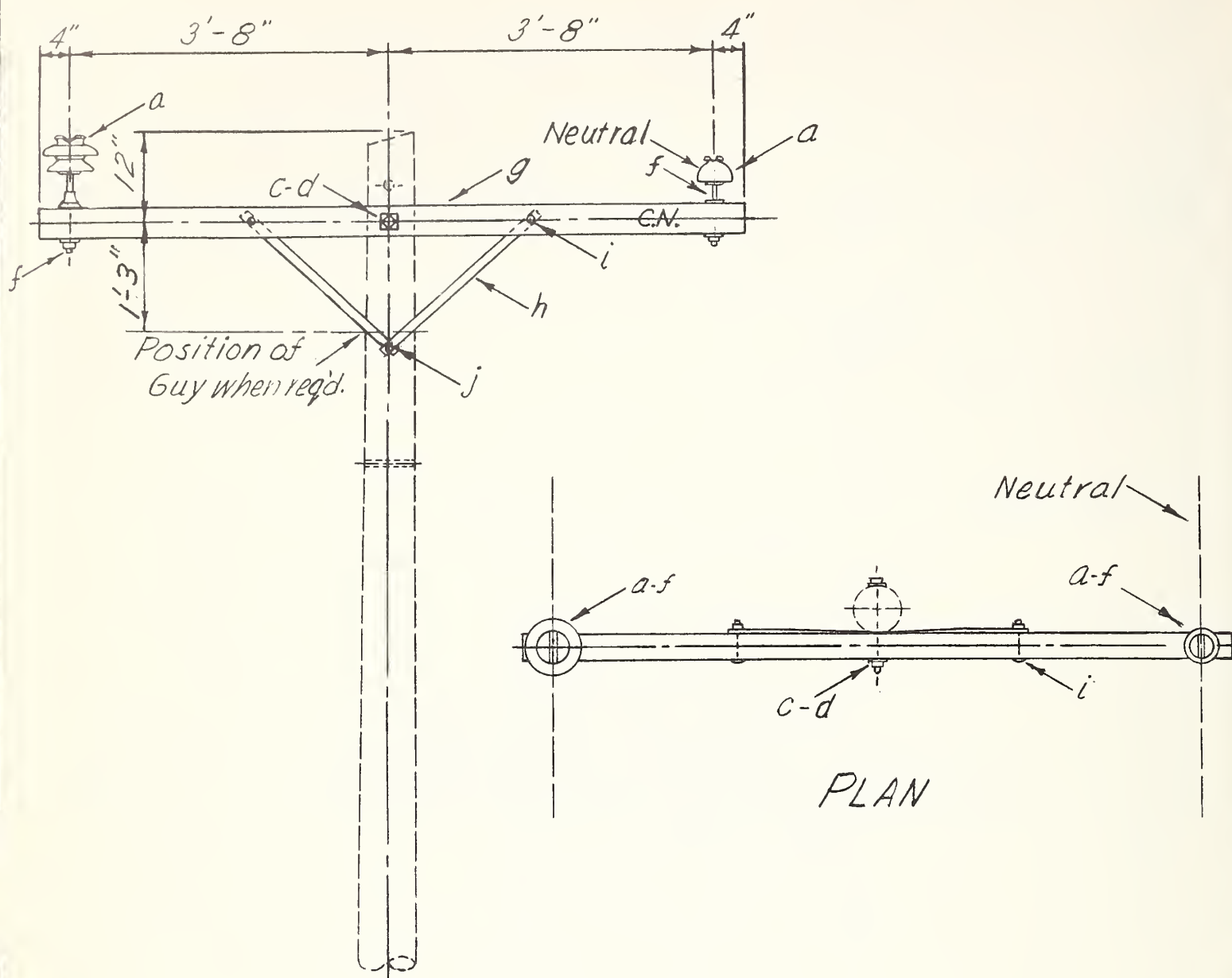
Date: July 29, 1949

NO. REVISION DATE:

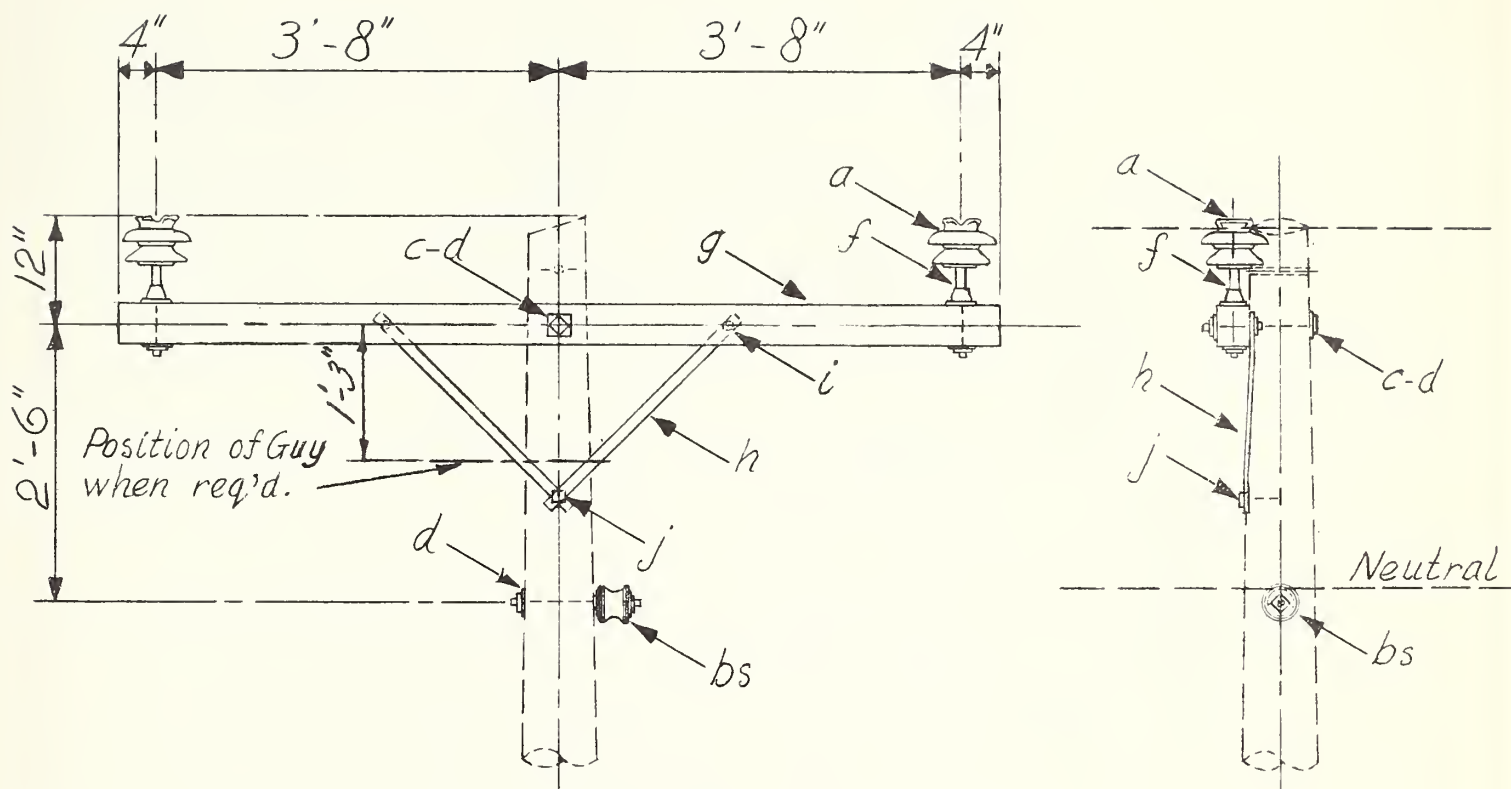
VA 8



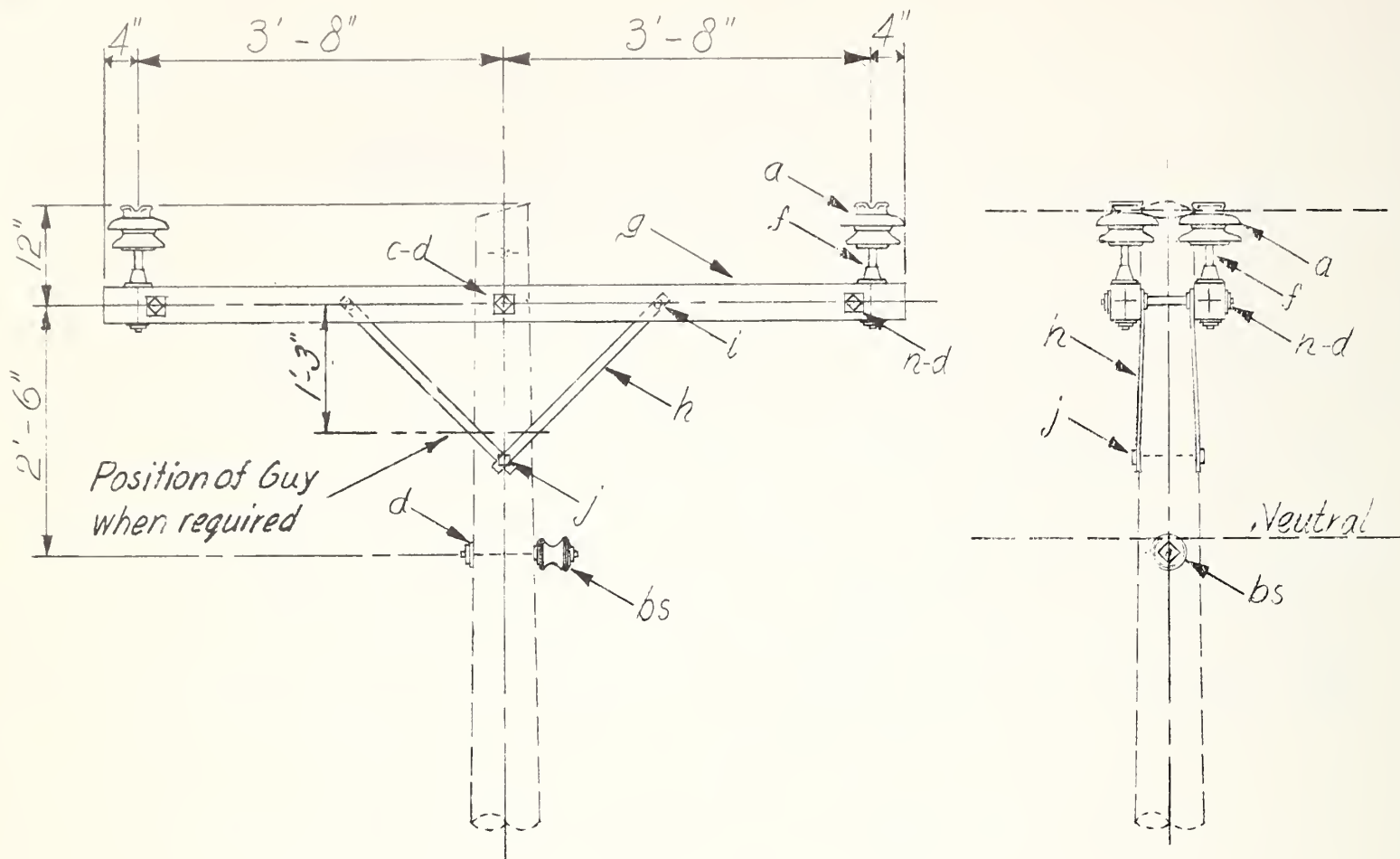
ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
a	2	Insulator, pin type	i	4	Bolt, carriage, $\frac{3}{8}$ " x $4\frac{1}{2}$ "
c	1	Bolt, machine, $\frac{5}{8}$ " x req'd. length	j	2	Screw, lag, $\frac{1}{2}$ " x 4"
d	10	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{5}{16}$ " hole	n	2	Bolt, double arming, $\frac{5}{8}$ " x req'd. length
f	2	Pin, crossarm, steel, $\frac{5}{8}$ " x 14"	f	2	Pin, crossarm, steel, $\frac{5}{8}$ " x $10\frac{3}{4}$ "
g	2	Crossarm, $3\frac{1}{2}$ " x $4\frac{1}{2}$ " x 8'-0"	d	2	Washer 3" x 3" x $\frac{1}{4}$ ", $\frac{13}{16}$ " hole
h	4	Brace, $\frac{1}{4}$ " x $\frac{1}{4}$ " x 28"			
a	2	Insulator, pin type 12.5 kv.			
	2	Letters "C.N.", 2", with 1" nails			
			14.4/24.9 KV. PRIMARY, 1-PHASE 2-WIRE NEUTRAL GROUND CROSSARM CONSTRUCTION-DOUBLE LINE ARM		
			Scale: $\frac{1}{2}$ " = 1'-0"		Date: June 10, '49
1	Minor changes	9-6-51	VA9		
No.	REVISION	Date:			



ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
a	1	Insulator, pin type	h	2	Brace, flat, 1 1/4" x 1/4" x 28"
d	2	Washer, 2 1/4" x 2 1/4" x 3/16", 1 3/16" hole	i	2	Bolt, carriage, 3/8" x 4 1/2"
f	1	Pin, crossarm, steel, 5/8" x 14"	j	1	Screw, lag, 1/2" x 4"
g	1	Crossarm, 3 1/2" x 4 1/2" x 8'-0"	f	1	Pin, crossarm, steel, 5/8" x 10 3/4"
a	1	Insulator, pin type, 12.5 kv.	c	1	Bolt, machine, 5/8" x req'd. length
	2	Letters "C.N.", 2" with 1" nails			
14.4/24.9 KV. PRIMARY, 1-PHASE 2-WIRE, NEUTRAL GROUNDED CROSSARM CONSTRUCTION - SINGLE LINE ARM			Scale: 1/2" = 1'-0"		
			Date: July 29, 1949		
1	Minor changes and additions	9-6-51	VA9-1		
N.O.	REVISION	DATE:			



ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
a	2	Insulator, pin type	h	2	Brace, 1/4" x 1/4" x 28"
c	1	Bolt, machine, 5/8" x req'd. length	i	2	Bolt, carriage, 5/8" x 4 1/2"
d	3	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	j	1	Screw, lag, 1/2" x 4"
f	2	Pin crossarm, steel, 5/8" x 14"	bs	1	Bolt, single upset, insulated
g	1	Crossarm, 3 1/2" x 4 1/2" x 8'-0"			
			1-1/2 KV. PRIMARY, TWO PHASE WIRES AND NEUTRAL CROSSARM CONSTR. - 0° TO 5° ANGLE. SINGLE PRIMARY SUPPORT		
			Scale: 1/2" = 1'-0"		Date: June 27, 40
No.	REVISION		Date:	VBI	



ITEM	No. REQ'D.	MATERIAL	ITEM	No. REQ'D.	MATERIAL
a	4	Insulator, pin type	i	4	Bolt, carriage, $\frac{3}{8}$ " x $4\frac{1}{2}$ "
c	1	Bolt, machine, $\frac{5}{8}$ " x req'd. length	j	2	Screw, lag, $\frac{1}{2}$ " x 4"
d	11	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole	n	2	Bolt, double arming, $\frac{5}{8}$ " x req'd. l'gth.
f	4	Pin, crossarm, steel, $\frac{5}{8}$ " x 14"	bs	1	Bolt, single upset, insulated
g	2	Crossarm, $3\frac{1}{2}$ " x $4\frac{1}{2}$ " x 8'-0"			
h	4	Brace, $1\frac{1}{4}$ " x $\frac{1}{4}$ " x 28"			

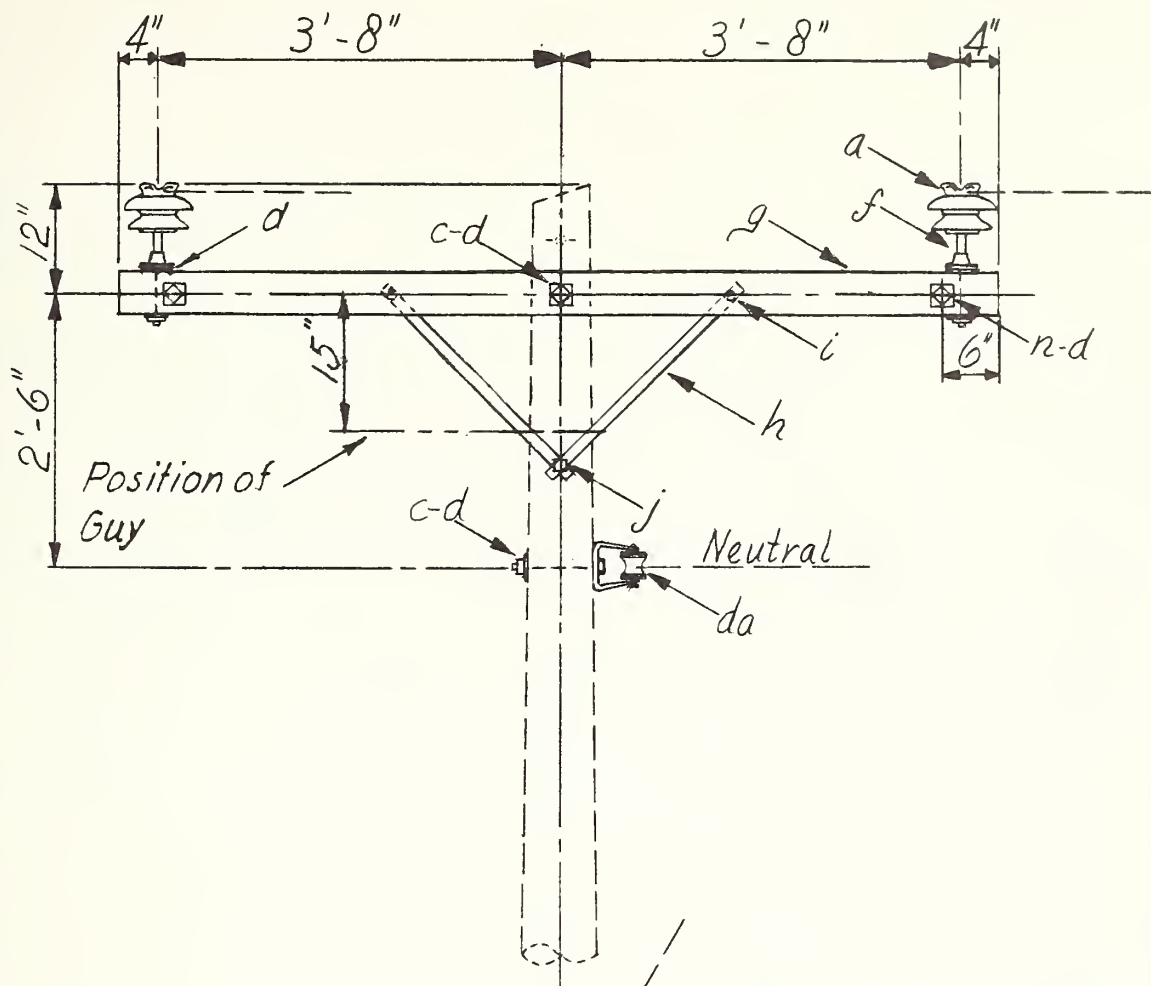
14.4/24.9KV. PRIMARY, TWO PHASE WIRES AND NEUTRAL
CROSSARM CONSTR. - 0° TO 5° ANGLE, DOUBLE PRIMARY SUPPORT

Scale: $\frac{1}{2}$ " = 1'-0"

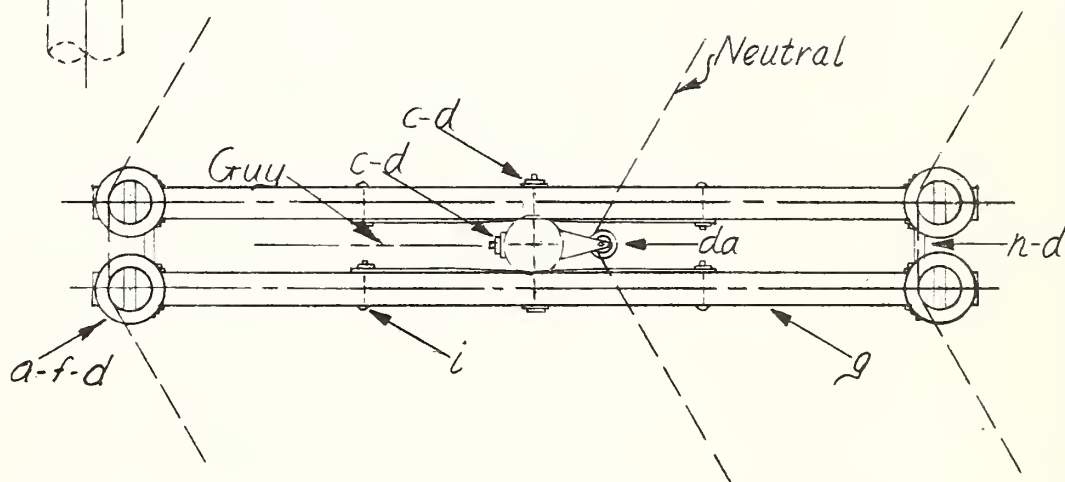
Date: June 27, '49

No. REVISION Date:

VBI-1



NOTE:
When the transverse load is more than 750 pounds per pin, use construction similar to C2-2R.



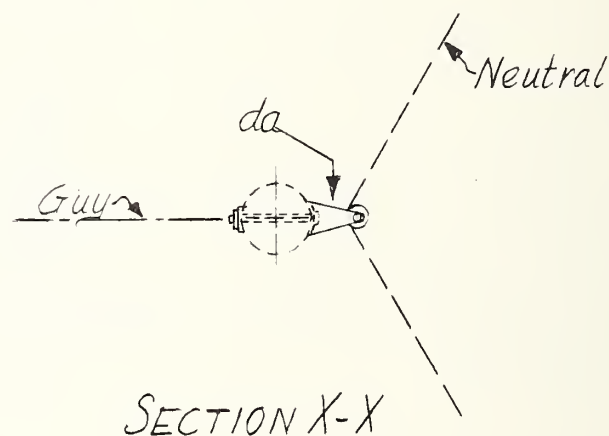
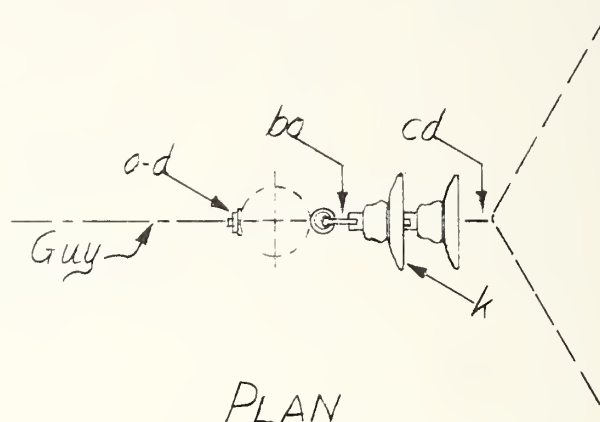
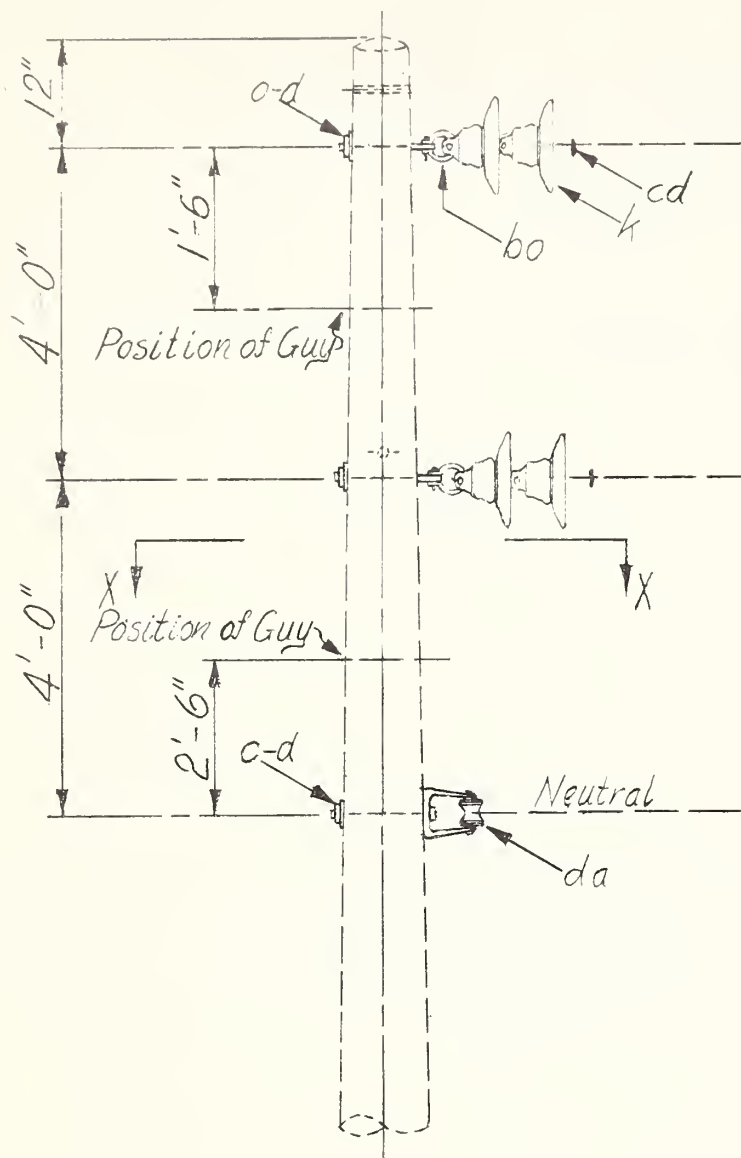
ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
a	4	Insulator, pin type	i	4	Bolt, carriage, $\frac{3}{8}$ " x $4\frac{1}{2}$ "
c	2	Bolt, machine, $\frac{5}{8}$ " x req'd. length	j	2	Screw, lag, $\frac{1}{2}$ " x 4"
d	11	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole	n	2	Bolt, double arming, $\frac{5}{8}$ " x req'd. l'gth.
f	4	Pin, crossarm, steel, $\frac{5}{8}$ " x 14"	da	1	Bracket, insulated
g	2	Crossarm, $3\frac{1}{2}$ " x $4\frac{1}{2}$ " x 8'-0"	d	4	Washer, 3 " x 3 " x $\frac{1}{4}$ ", $\frac{13}{16}$ " hole
h	4	Brace, $1\frac{1}{4}$ " x $\frac{1}{4}$ " x 28"			

14.4/24.9 KV. PRIMARY, TWO PHASE WIRES AND NEUTRAL
CROSSARM CONSTRUCTION - 5° TO 30° ANGLE

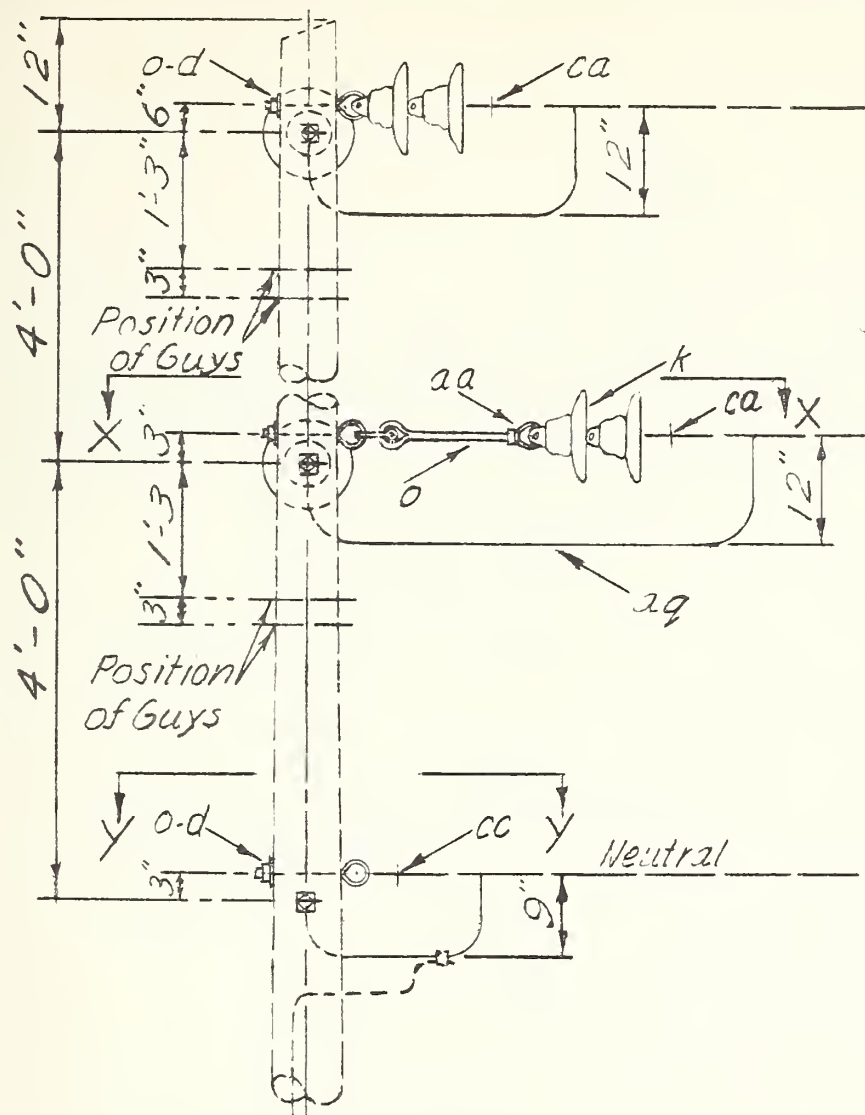
1	Minor changes	3-8-51	Scale: $\frac{1}{2}$ " = 1'-0"	Date: June 27, 49
No.	REVISION	Date:		VB2R

NOTE:

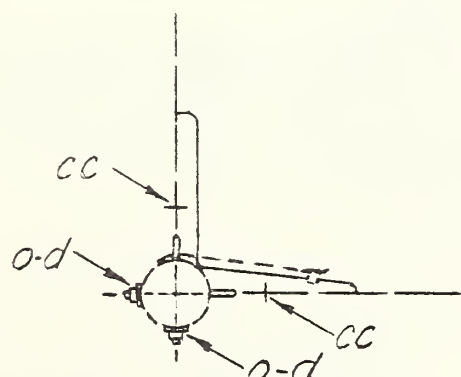
The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.



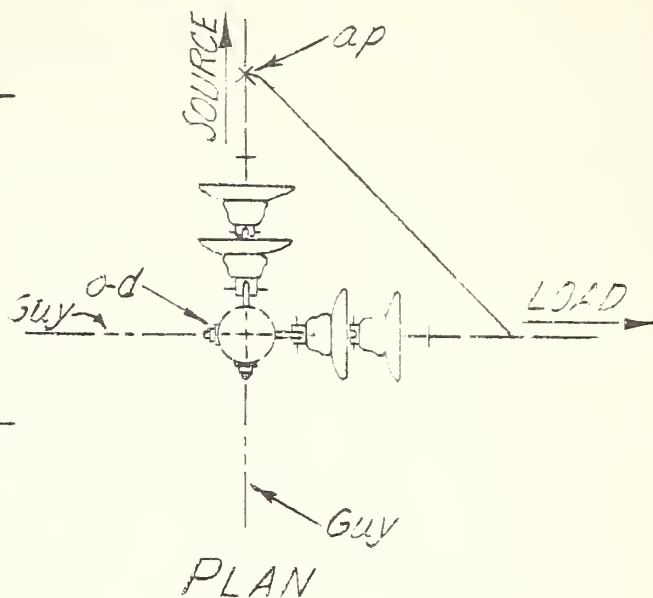
ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
c	1	Bolt, machine, $\frac{5}{8}$ " x req'd. length	bo	2	Shackle, anchor
d	3	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole	cd	2	Angle assembly, primary
k	4	Insulator, suspension, 10"	da	1	Bracket, insulated
o	2	Bolt, eye, $\frac{5}{8}$ " x req'd. length			
<p>14.4/24.9KV. PRIMARY, TWO PHASE WIRES AND NEUTRAL VERTICAL CONSTRUCTION - 30° TO 60° ANGLE.</p> <p>Scale: $\frac{1}{2}$" = 1'-0"</p> <p>Date: June 28, '49</p> <p>V B J</p>					
No.	REVISION		Date:		



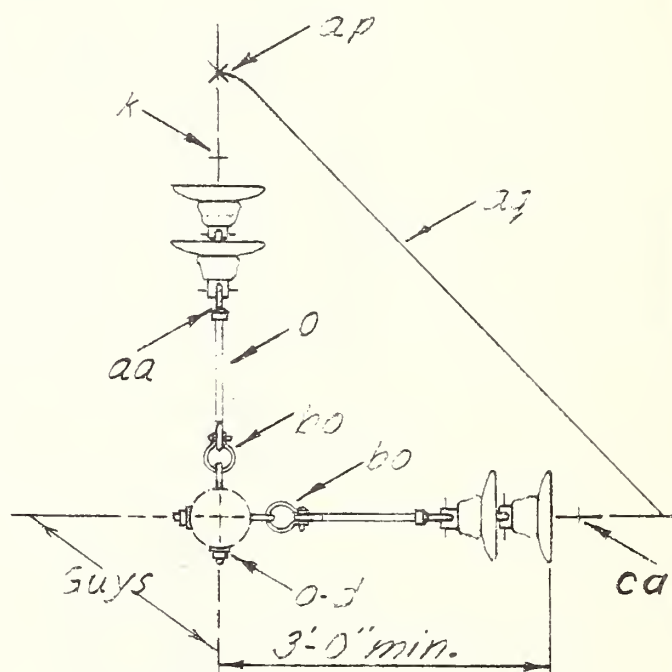
ELEVATION



SECTION Y-Y



PLAN



SECTION X-X

NOTE:

The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.

ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
d	6	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	ap	2	Clamp, hot line, tap assembly
k	8	Insulator, suspension, 10"	aq		Jumpers and leads, as req'd.
o	8	Bolt, eye, 5/8" x req'd. length	bo	2	Shackle, anchor
p		Connectors, as required	ca	4	Leadend assembly, primary
aa	2	Nut, eye, 5/8"	cc	2	Deadend assembly, neutral

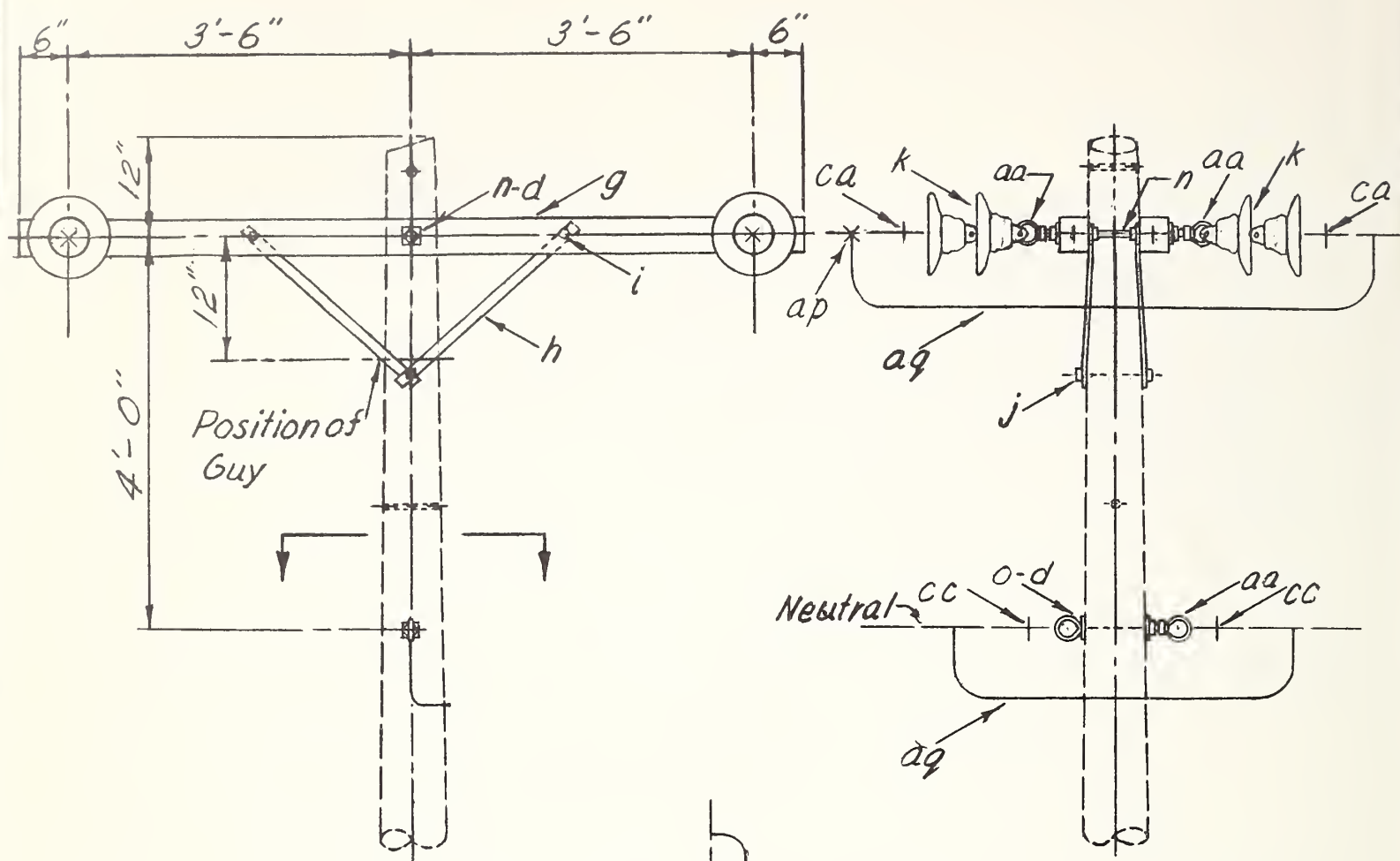
14.4/24.9 Kv. PRIMARY, 2-PHASE WIRES AND NEUTRAL
VERTICAL CONSTRUCTION-60° TO 90° ANGLE

Scale: 1/2" = 1'-0"

Date: July 25, 1949

NO. REVISION DATE:

VB4-1



ELEVATION

SIDE ELEVATION

Note: When the line may be energized from either end, hot line clamps should be installed on both ends of the jumper.

NOTE:

The two 10-inch suspension insulators shown may be replaced by three 6 inch insulators.

SECTION X-X

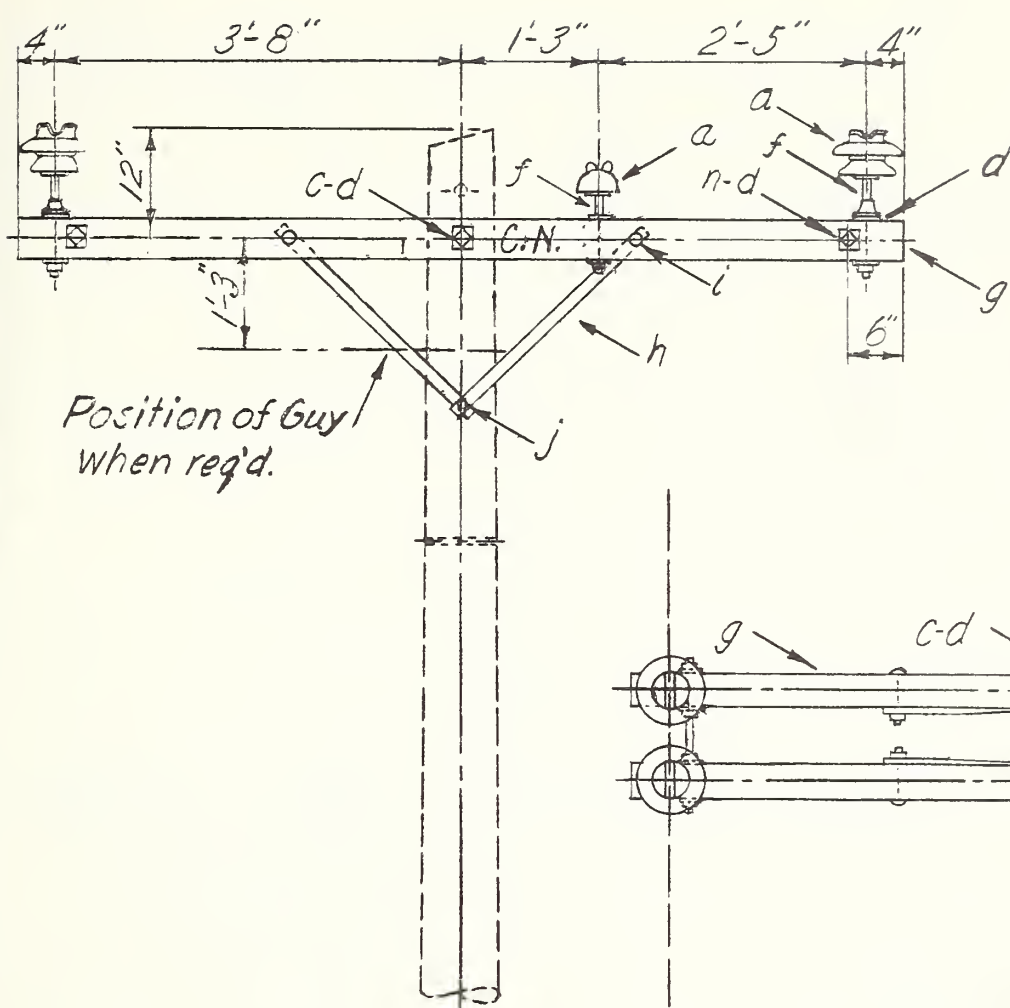
ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
			o	1	Bolt, eye, 5/8" x reqd. length
d	12	Washer, 2 1/4" x 2 1/4" x 3/16", 3/16" hole	p		Connectors, as required.
g	2	Crossarm, 3 1/2" x 4 1/2" x 8'-0"	aa	5	Nut, eye, 5/8"
h	4	Brace, flat, 1 1/4" x 1/4" x 26"	ap	2	Clamp, hot line, tap assembly
i	4	Bolt, carriage, 3/8" x 4 1/2"	aq		Jumpers
j	2	Screw, lag, 1/2" x 4"	ca	4	Deadend assembly, primary
k	6	Insulator, suspension, 10"	cc	2	Deadend assembly, neutral
n	3	Bolt, double arming, 5/8" x reqd. lgth.			

14. 4/24.9 KV. PRIMARY, TWO PHASE WIRES AND NEUTRAL CROSSARM CONSTRUCTION-DEADEND (DOUBLE)

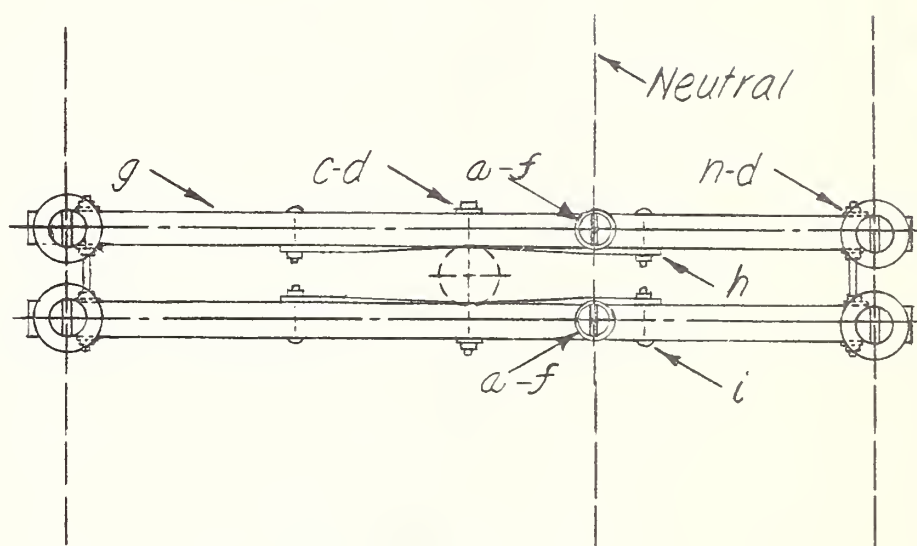
Scale: 1/2" = 1'-0"

Date: July 26, 1949

NO.	REVISION	DATE	
			VB8

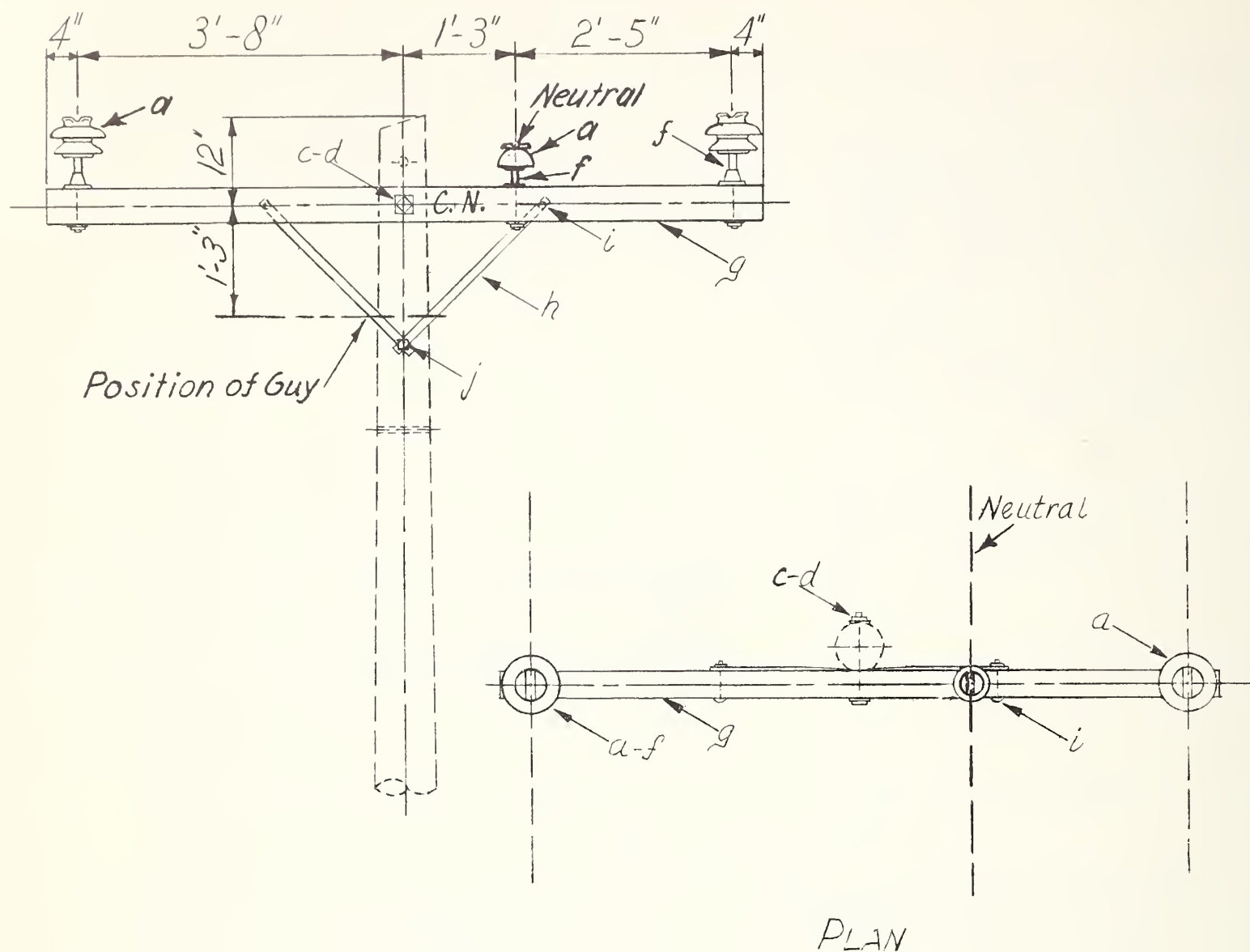


ELEVATION

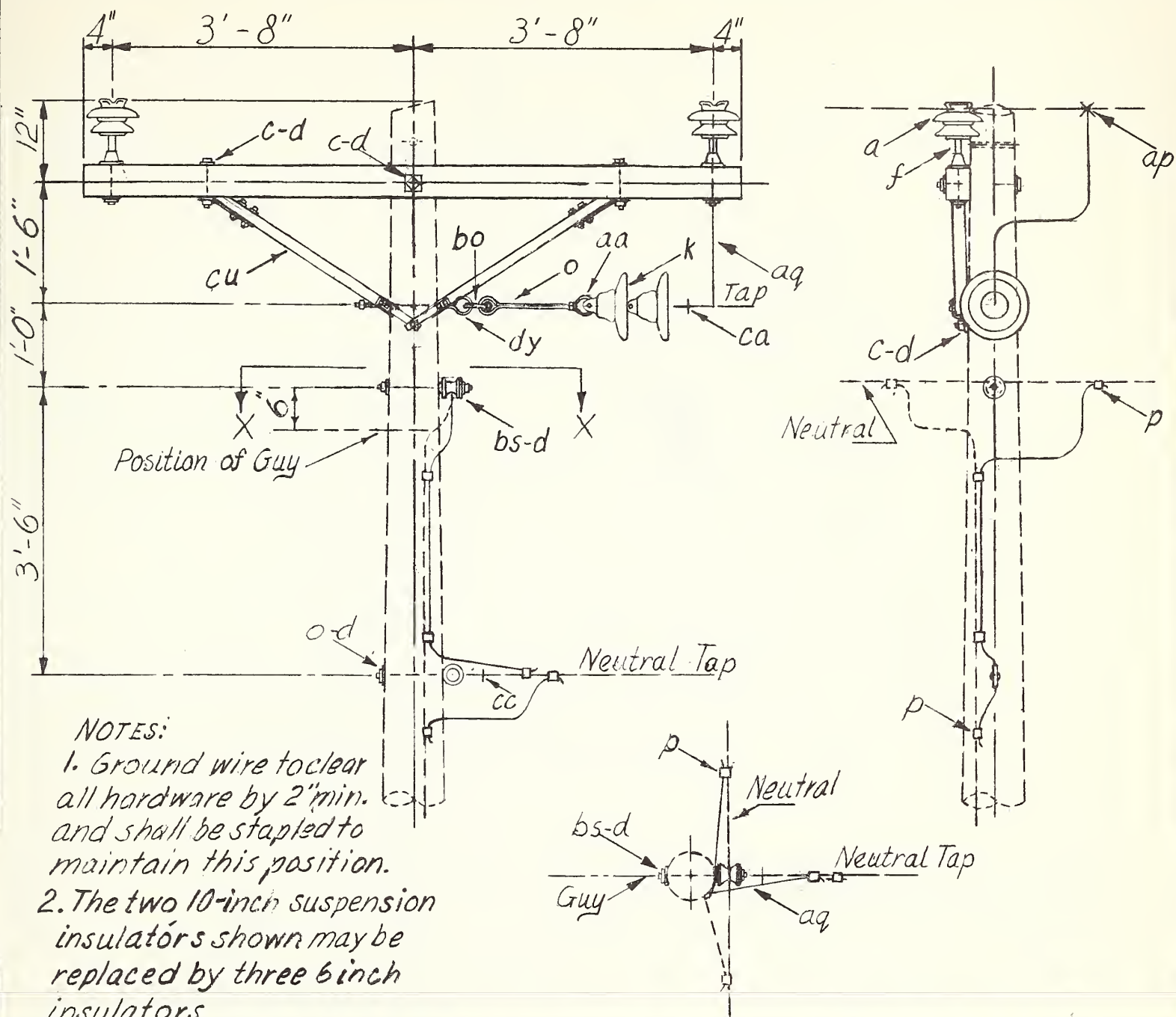


PLAN

ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
a	4	Insulator, pin type,	h	4	Brace, flat, 1/4" x 1/4" x 28"
c	1	Bolt, machine, 5/8" x reg'd. length	i	4	Bolt, carriage, 3/8" x 4 1/2"
d	10	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	j	2	Screw, lag, 1/2" x 4"
d	4	Washer, 3" x 3" x 1/4", 13/16" hole	n	2	Bolt, double arming, 5/8" x reg'd. lgth
f	4	Pin, crossarm, steel, 5/8" x 14"	a	2	Insulator, pin type 12.5 KV
g	2	Crossarm, 3 1/2" x 4 1/2" x 8'-0"	f	2	Pin, Crossarm, steel 5/8" x 10 3/4"
	2	Letters "C.N.", 2", with 1" nails			
			14.4/24.9 KV. PRIMARY, TWO PHASE WIRES AND NEUTRAL CROSSARM CONSTRUCTION - DOUBLE LINE ARM		
			Scale: 1/2" = 1'-0"		
1	Replace bs with a f f				Date: July 27, 1949
NO.	REVISION				VB9



ITEM	No. REQD	MATERIAL	ITEM	No. REQD	MATERIAL
a	2	Insulator, pin type.	h	2	Brace, 1/4" x 1/4" x 28"
c	1	Bolt, machine, 5/8" x req'd length	i	2	Bolt, carriage, 3/8" x 1 1/2"
d	2	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	j	1	Screw, lag, 1/2" x 4"
f	2	Pin, crossarm, steel, 5/8" x 14"	a	1	Insulator, pin type, 12.5 Kv.
g	1	Crossarm, 3 1/2" x 4 1/2" x 8'-0"	f	1	Pin, crossarm, steel, 5/8" x 10 3/4"
	2	Letters "C.N.", 2", with 1" nails			
			14.4/24.9 KV. PRIMARY, TWO PHASE WIRES AND NEUTRAL CROSSARM CONSTRUCTION - SINGLE LINE ARM		
			Scale: 1/2" = 1'-0"		
1 Replace bs with a & f			Date: June 29, 49		
No.	REVISION		Date:		
			VB.9-1		



SECTION X-X

ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
a	2	Insulator, pin type	o	2	Bolt, eye, $\frac{5}{8}$ " x req'd. length
c	2	Bolt, machine, $\frac{7}{8}$ " x req'd. length	p		Connectors, as req'd.
d	7	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole	aa	1	Nut, eye, $\frac{5}{8}$ "
f	2	Pin, crossarm, steel, $\frac{5}{8}$ " x 14"	ap	1	Clamp, hot line, tap assembly
g	1	Crossarm, $3\frac{1}{2}$ " x $4\frac{1}{2}$ " x 8'-0"	aq		Jumpers and leads, as req'd.
c	2	Bolt, machine, $\frac{1}{2}$ " x req'd. length	bo	1	Shackle, anchor
d	2	Washer, round, $1\frac{3}{8}$ " dia., $\frac{9}{16}$ " hole	bs	1	Bolt, single upset, insulated
k	2	Insulator, suspension, 10"	ca	1	Deadend assembly, primary
cu	1	Brace, wood, $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x 60" span	cc	1	Deadend assembly, neutral
			dy	1	Bolt, eye, double crining, $\frac{5}{8}$ "

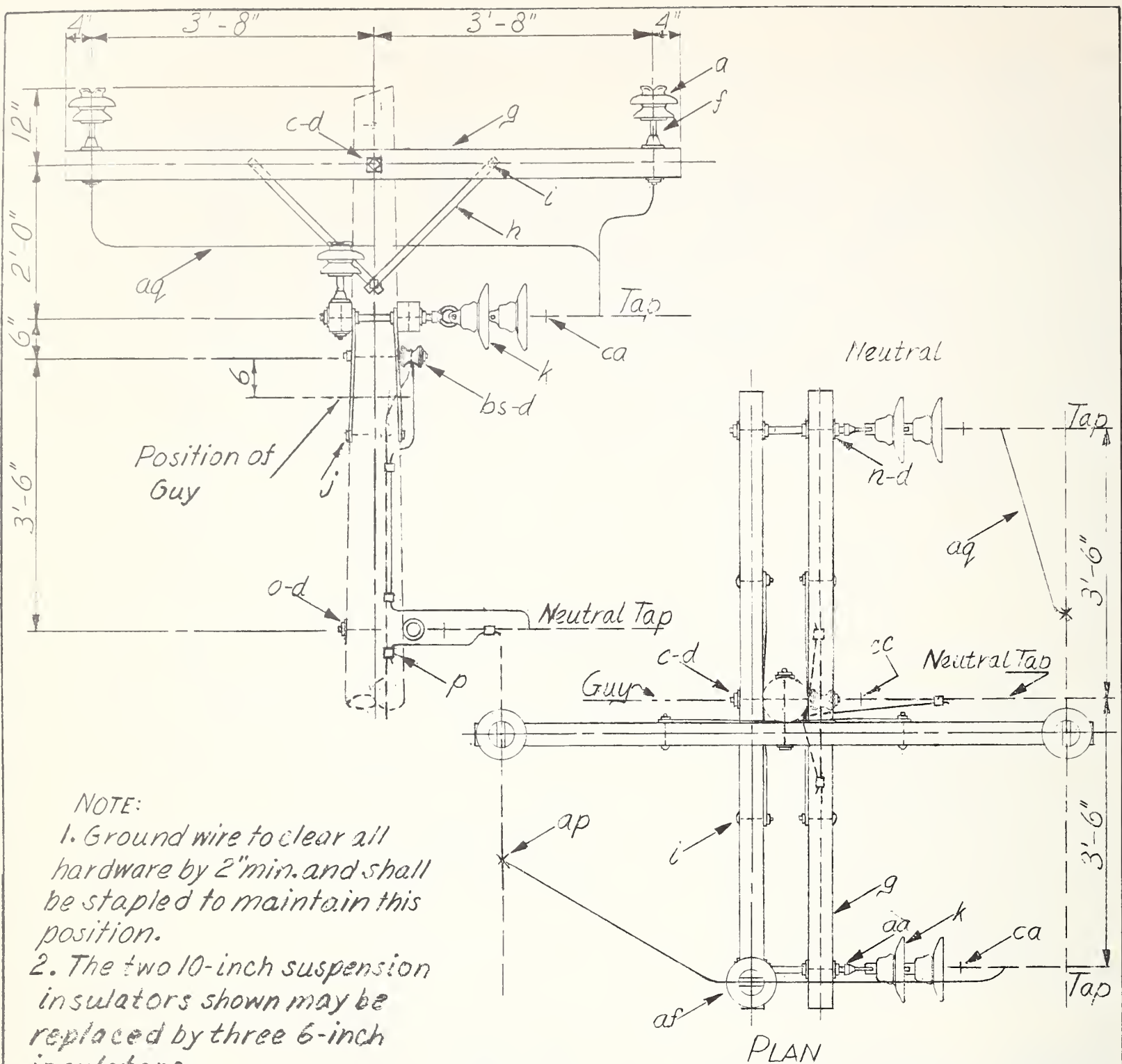
14.4/24.9 KV. PRIMARY, TWO PHASE WIRES AND NEUTRAL
CROSSARM CONSTR. - SINGLE PHASE TAP AT 0° TO 5° ANGLE

Scale: $\frac{1}{2}$ " = 1'-0"

Date: June 29, '49

1	Minor changes	9-6-51
No.	REVISION	Date:

VB21



ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
a	3	Insulator, pin type	o	1	Bolt, eye, $\frac{5}{8}$ " x req'd. length
c	2	Bolt, machine, $\frac{5}{8}$ " x req'd. length	p		Connectors, as req'd.
d	14	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{16}$ " hole	aa	2	Nut, eye, $\frac{5}{8}$ "
f	3	Pin, crossarm, steel, $\frac{5}{8}$ " x $1\frac{1}{2}$ "	ap	2	Clamp, hotline, tap assembly
g	3	Crossarm, $3\frac{1}{2}$ " x $4\frac{1}{2}$ " x 8'-0"	aq		Jumpers and leads, as req'd.
h	6	Brace, flat, $1\frac{1}{4}$ " x $\frac{1}{4}$ " x 28"	bs	1	Bolt, single upset, insulated
i	6	Bolt, carriage, $\frac{3}{8}$ " x $4\frac{1}{2}$ "	ca	2	Deadend assembly, primary
j	3	Screw, lag, $\frac{1}{2}$ " x 4"	cc	1	Deadend assembly, neutral
k	4	Insulator, suspension, 10"			
n	2	Bolt, double arming, $\frac{5}{8}$ " x req'd. l'gth.			

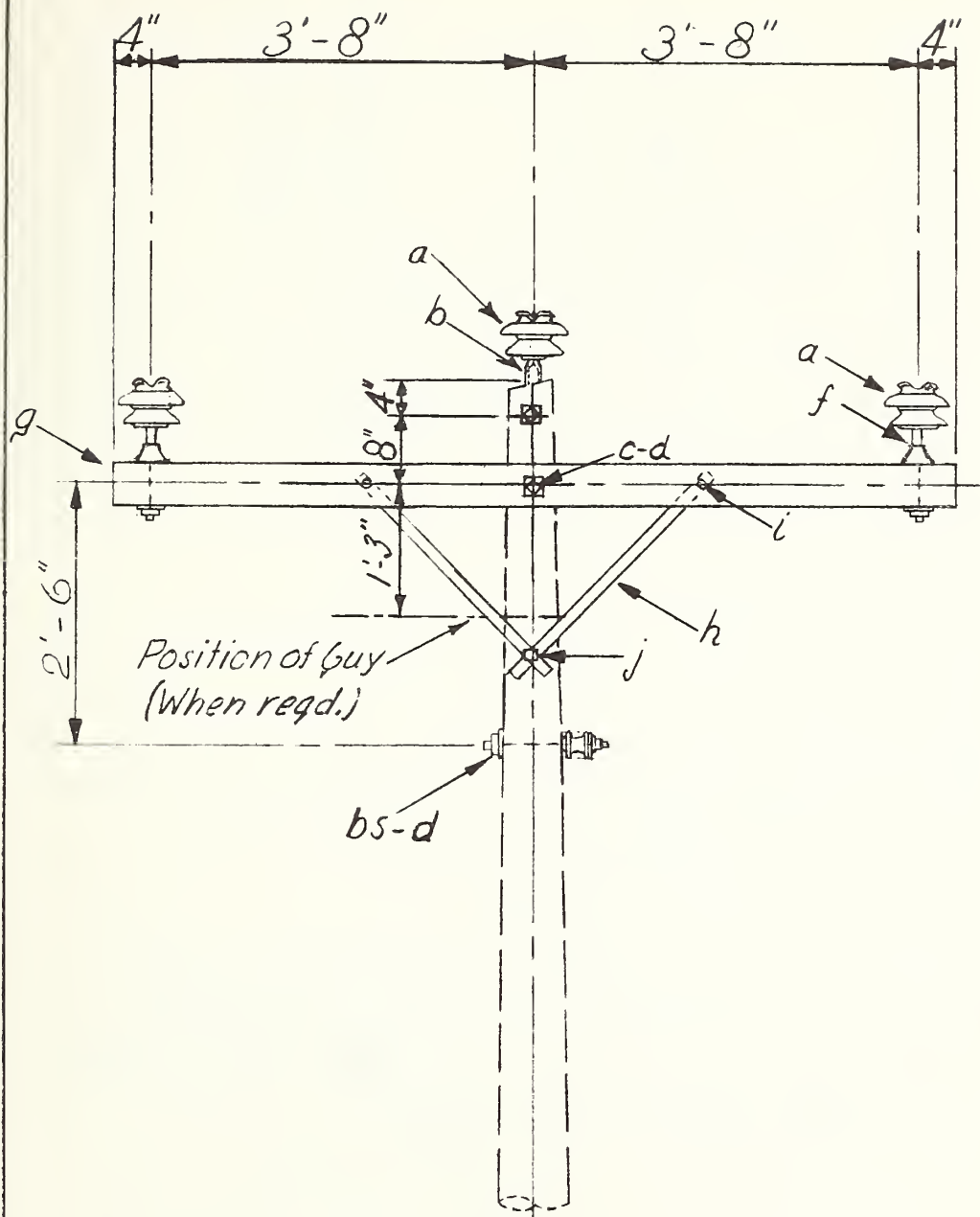
14.4/24.9KV. PRIMARY, TWO PHASE WIRES AND NEUTRAL
CROSSARM CONSTR.- TWO-PHASE TAP AT 0° TO 5° ANGLE

Scale: $\frac{1}{2}$ " = 1'-0"

Date: June 29, 49

No. REVISION Date:

VB23



ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
a	3	Insulator, pin type,	h	2	Brace, $1/4" \times 1/4" \times 28"$
b	1	Pin, pole top, 20"	i	2	Bolt, carriage, $3/8" \times 4 1/2"$
c	2	Bolt, machine, $5/8" \times$ req'd. Length	j	1	Screw, Lag, $1/2" \times 4"$
d	3	Washer, $2 1/4" \times 2 1/4" \times 3/16"$, $13/16"$ hole	bs	1	Bolt, single upset, insulated
f	2	Pin, crossarm, steel, $5/8" \times 14"$			
g	1	Crossarm, $3 1/2" \times 4 1/2" \times 8'-0"$			

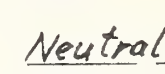
14.4/24.9 KV: PRIMARY, 3-PHASE 4-WIRE STAR-CROSSARM
CONSTR.-SINGLE PRIMARY SUPPORT AT 0° TO 5° ANGLE.

Scale: $1/2" = 1'-0"$

Date: June 6, '49

1	Changed neutral support	1/24/49
No.	REVISION	Date:

VC1

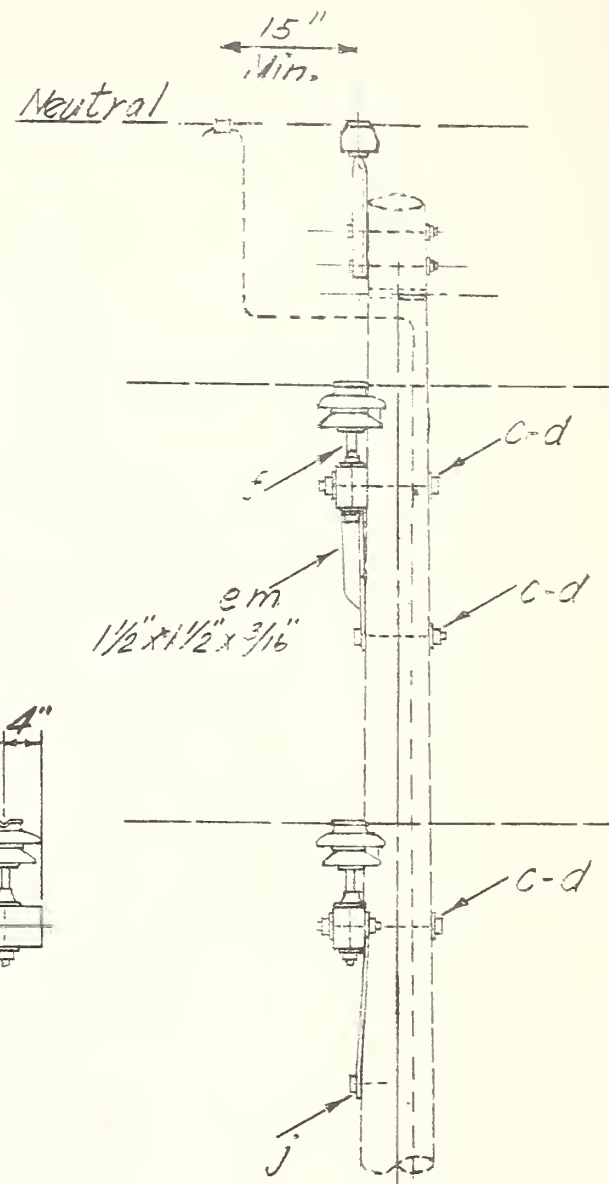
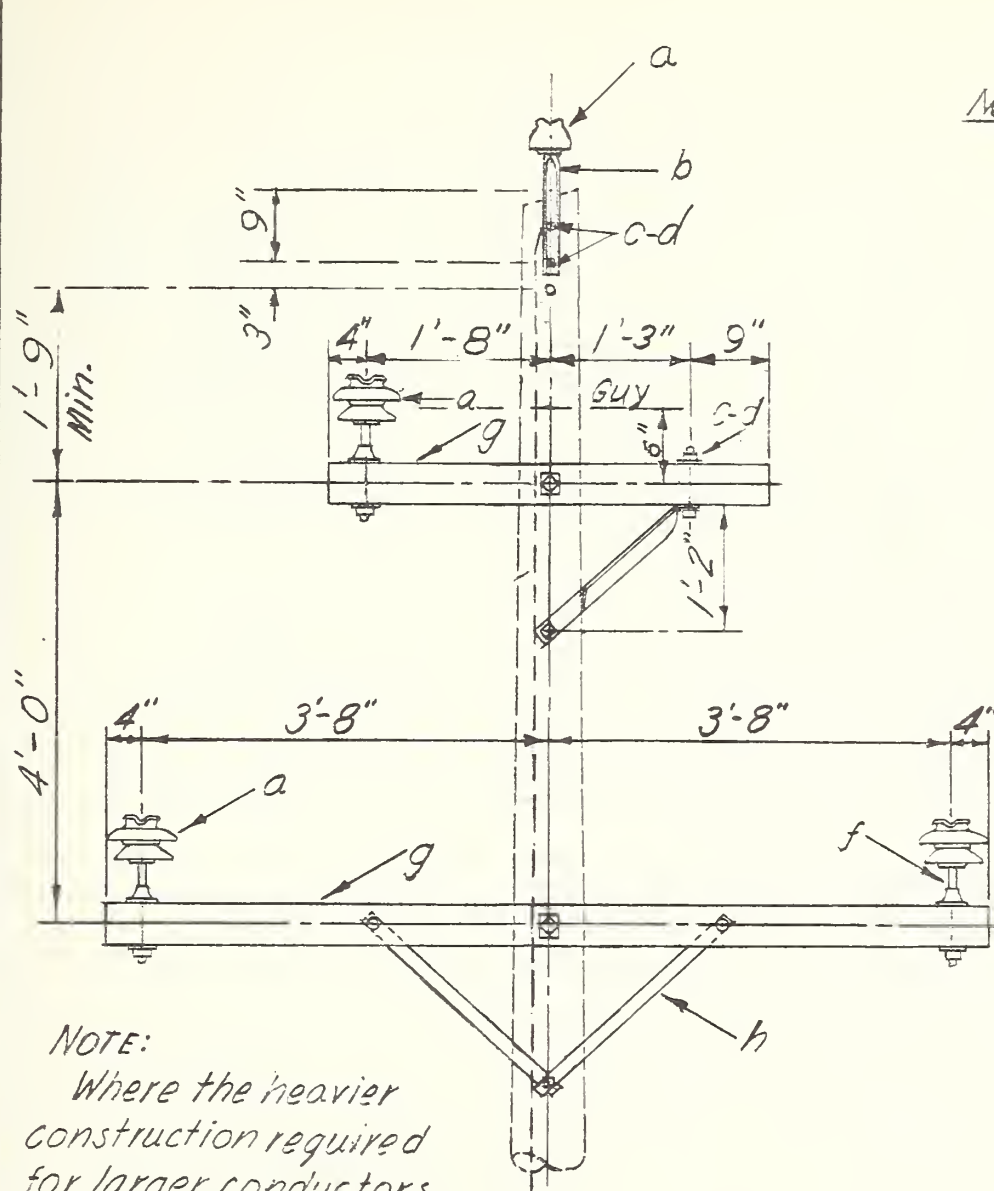


When the transverse load is more than 500 pounds per pin, construction similar to C2-2R should be used.

14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
CROSSARM CONSTR.-DOUBLE PRIMARY SUPPORT AT 0° TO 5° ANGLE

VC1-1

No.	REVISION	DATE:
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SIDE ELEVATION

NOTE:

Where the heavier construction required for larger conductors is desired, specify this assembly unit as VCI-5L and change items in the material list as required

ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
a	3	Insulator, pin type,	j	1	Screw, lag, 1/2"x4"
c	6	Bolt, machine, 5/8"x req'd. length	a	1	Insulator, pin type, 7.2/12.5 KV.
d	8	Washer, 2 1/4"x 2 1/4"x 3/16", 3/16" hole	b	1	Pin, pole top, 15"
f	3	Pin, crossarm, steel, 5/8"x 14"	p		Connectors, as required
g	1	Crossarm, 3 1/2"x 4 1/2"x 4'-0"	em	1	Brace, crossarm, special
g	1	Crossarm, 3 1/2"x 4 1/2"x 8'-0"			
h	2	Brace, flat, 1 1/4"x 1/4"x 28"			
i	2	Bolt, carriage, 3/8"x 4 1/2"			

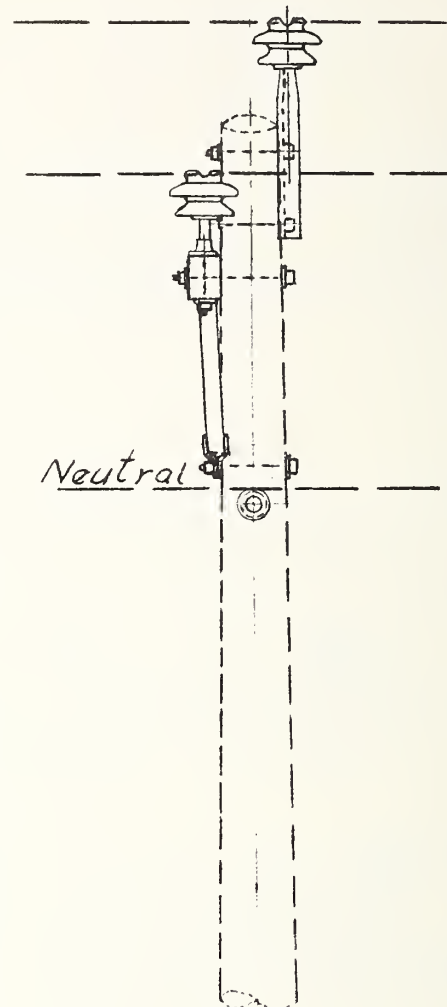
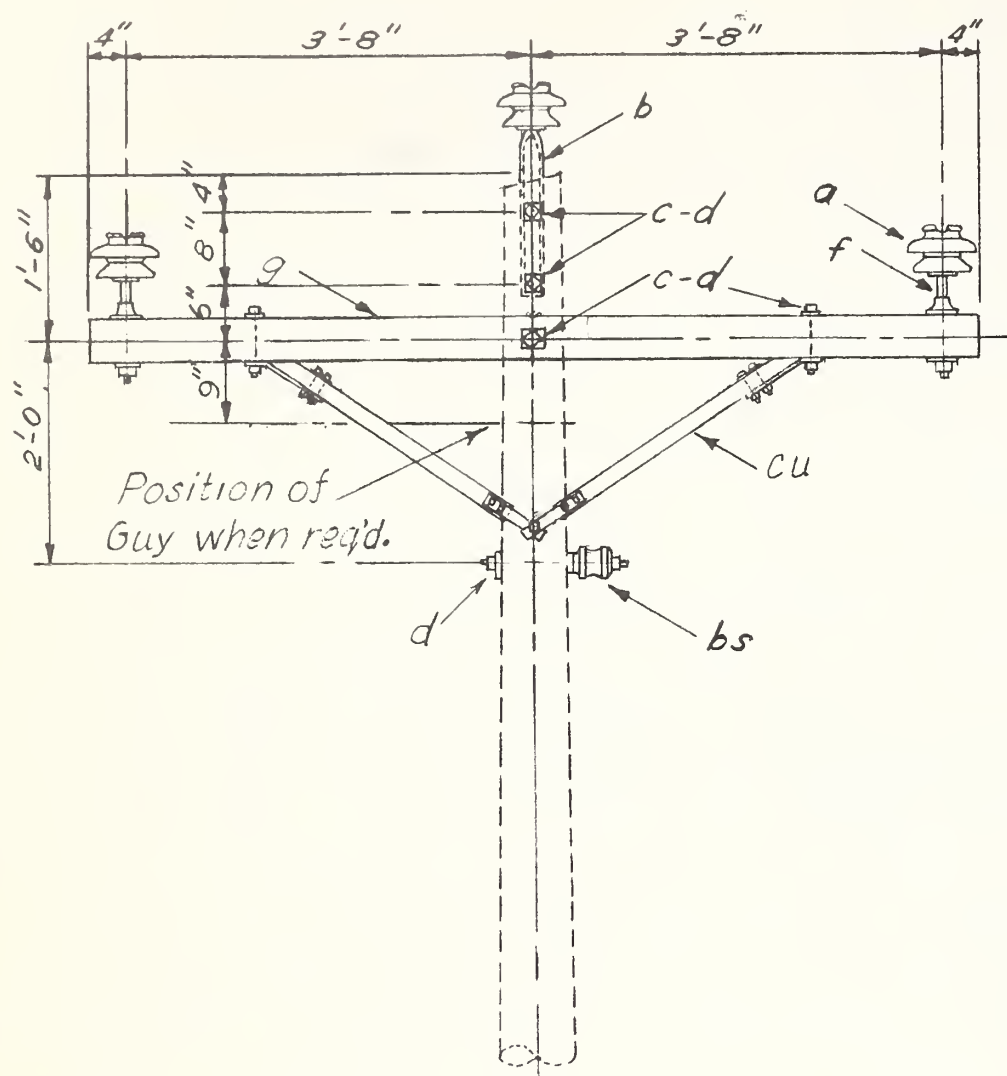
14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
CROSSARM CONSTRUCTION-SINGLE CIRCUIT
SINGLE PRIMARY SUPPORT WITH OVERHEAD GROUND WIRE

Scale: 1/2"=1'-0"

Date: Aug 31, 1949

1	Changed pole top	9-13-51
NO.	REVISION	DATE:

VCI-5



Note:
This may be used for conversion units
when considered applicable.

ITEM	NO. REQ'D	MATERIAL	ITEM	NO. REQ'D	MATERIAL
a	3	Insulator, Pin type	g	1	Crossarm, 3½" x 4½" x 3'-0"
b	1	Pin, Pole top, 20"	cu	1	Brace, wood, 60" span
c	4	Bolt, machine, ⅝" x req'd. length	c	2	Bolt, machine, ½" x req'd. length
d	6	Washer, 2¼" x 2¼" x ⅜", ⅜" hole	d	2	Washer, rd. 1⅜" dia., ⅜" hole
f	2	Pin, crossarm steel ⅝" x 14"	bs	1	Bolt, single upset, insulated

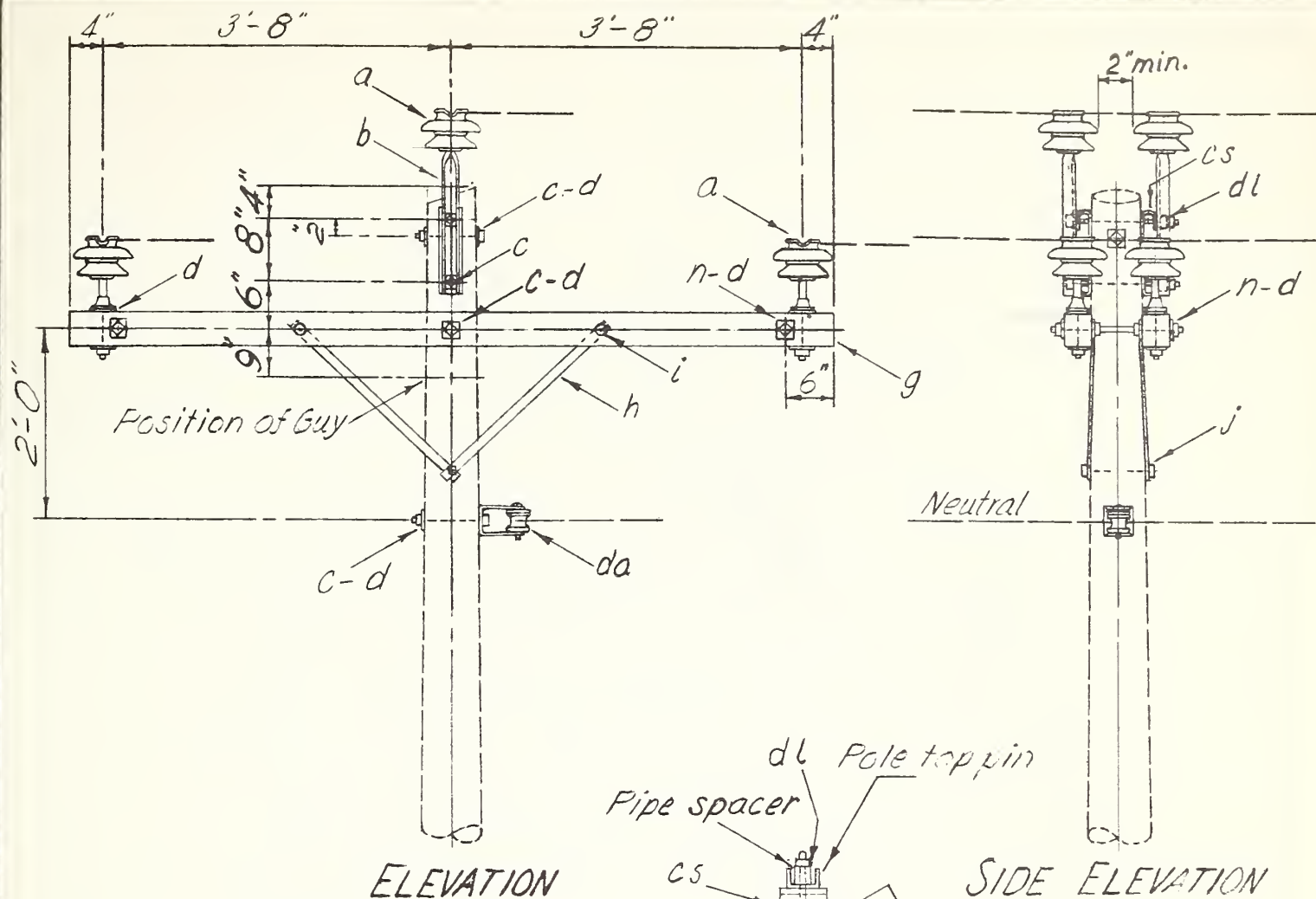
14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
CROSSARM CONSTR.-SINGLE PRIMARY SUPPORT AT 70.5° ANGLE
Scale ½"=1'-0"

April 11, 1951

VCI-7

NO. REVISION

DATE:



NOTE:

When the transverse load is more than 500 pounds per pin, construction similar to C2-2R should be used.

POLE TOP PIN ASSEMBLY

ITEM	NO. REQ'D	MATERIAL	ITEM	NO. REQ'D	MATERIAL
a	6	Insulator, pin type	i	4	Bolt, carriage, $\frac{5}{8}$ " x $4\frac{1}{2}$ "
b	2	Pin, pole top, 20"	j	2	Screw, lag, $\frac{1}{2}$ " x 4"
c	5	Bolt, machine, $\frac{5}{8}$ " x reg'd. length	n	2	Bolt, double arming, $\frac{5}{8}$ " x reg'd. length
d	13	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{9}{16}$ ", $\frac{13}{16}$ " hole	cs	2	Pole top bracket
d	4	Washer, 3 " x 3 " x $\frac{1}{4}$ ", $\frac{13}{16}$ " hole	da	1	Bracket, insulated
f	4	Pin, crossarm, steel, $\frac{5}{8}$ " x 14"	dl	1	Pipe spacer, $\frac{3}{4}$ " dia. x $1\frac{1}{2}$ "
g	2	Crossarm, $3\frac{1}{2}$ " x $4\frac{1}{2}$ " x 8'-0"			
h	4	Brace, flat, $1\frac{1}{4}$ " x $\frac{1}{4}$ " x 28"			

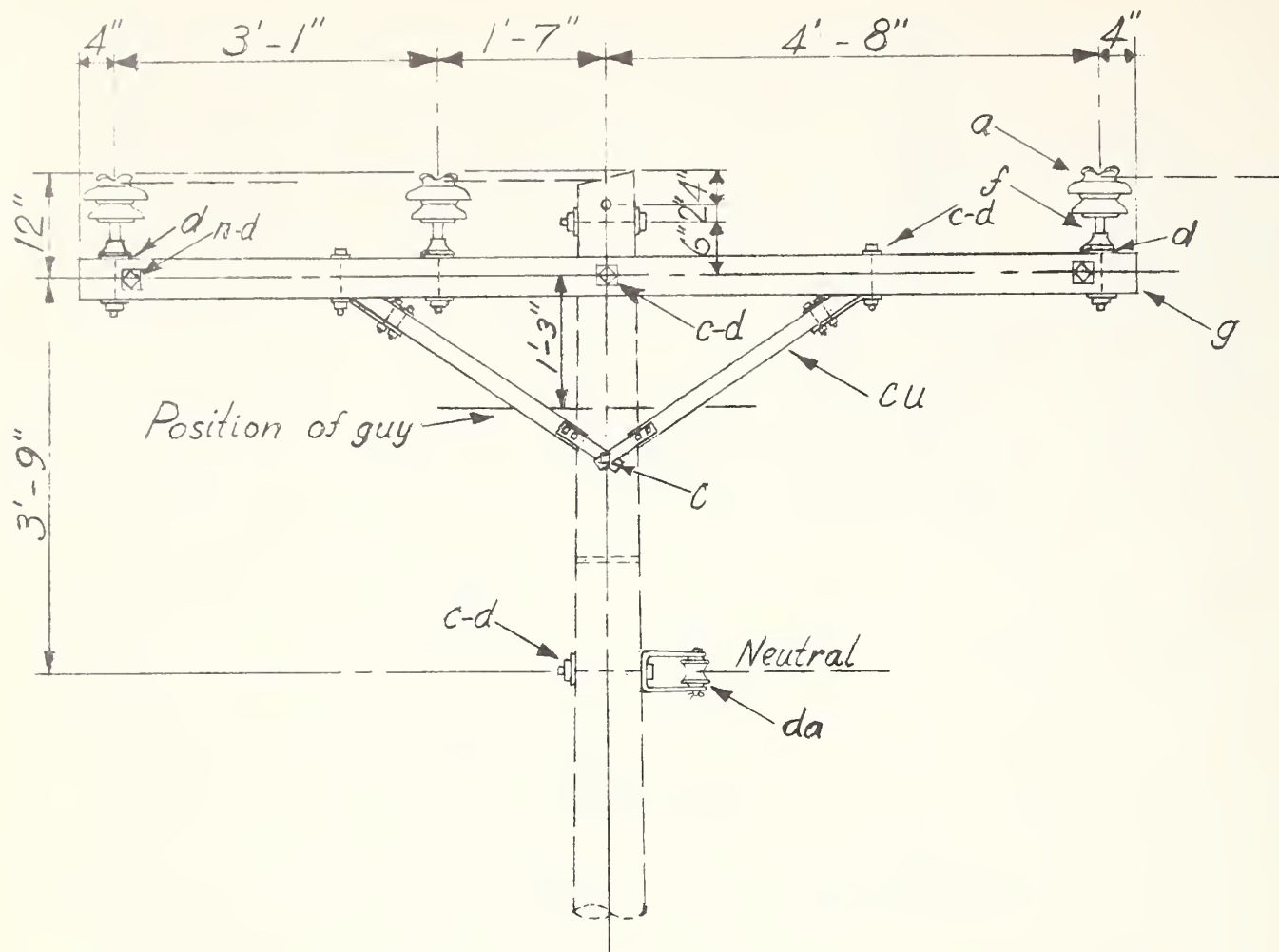
14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
CROSSARM CONSTR.-DOUBLE PRIMARY SUPPORT AT 5° TO 30° ANGLE

Scale: $\frac{1}{2}$ " = 1'-0"

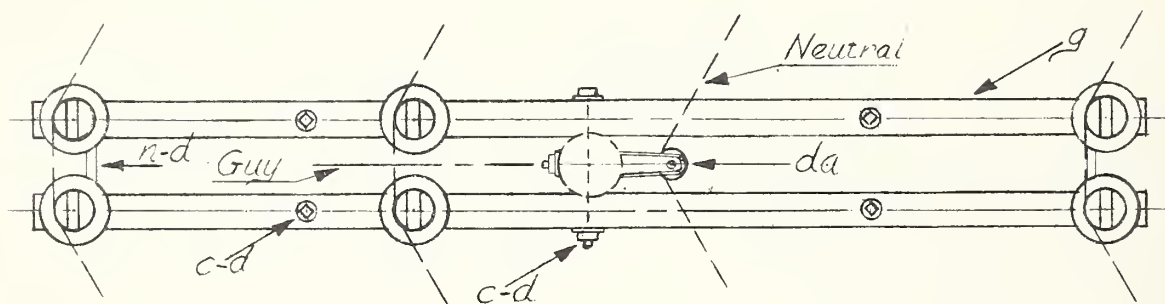
Date: May 29, 1950

1	As drawn	5/29/50
NO.	REVISION	DATE:

VC2R



PLAN

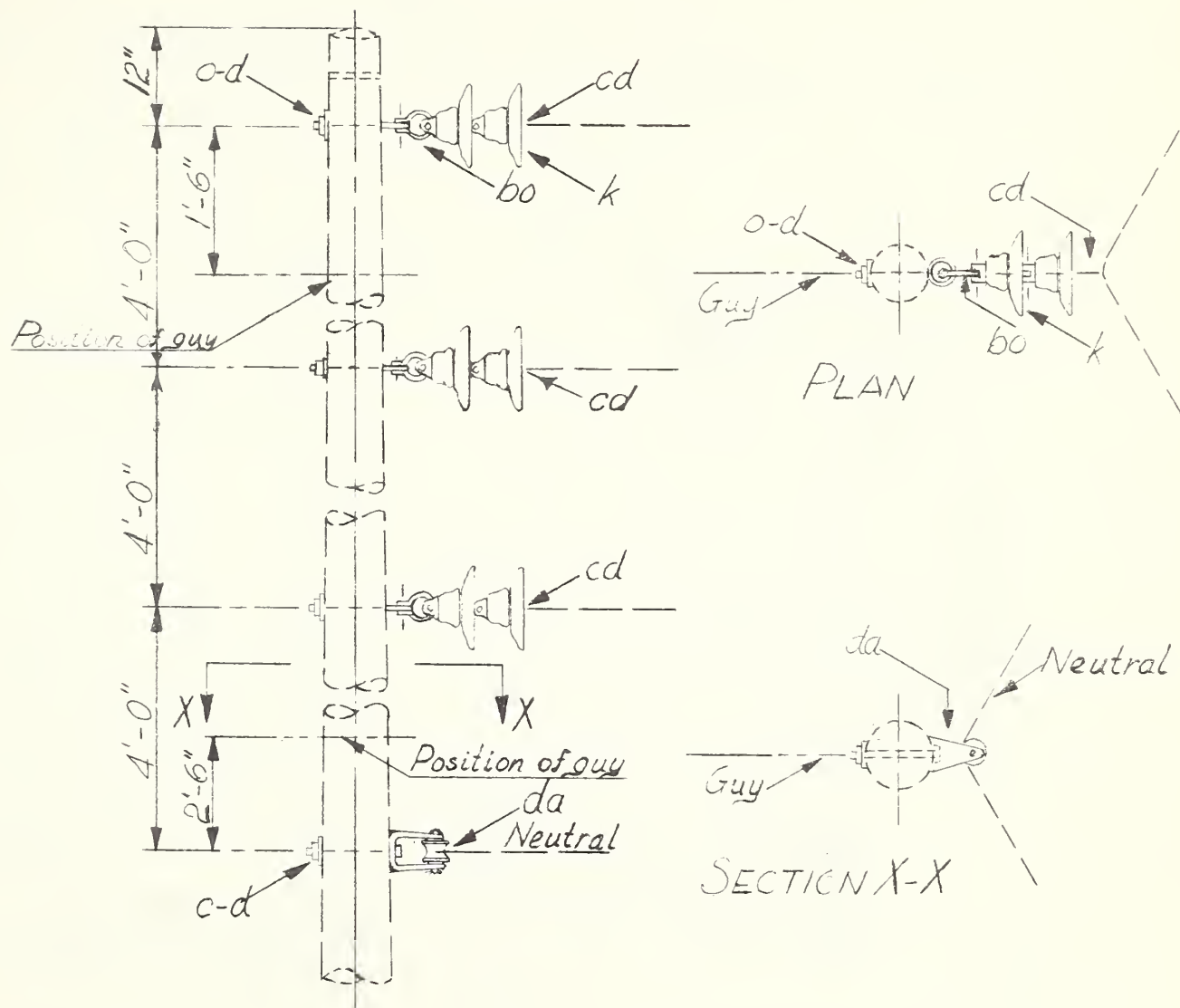


NOTES: Center phase wire or neutral wire may be located on the opposite side of the pole where necessary to avoid crossing of wires in midspan.
Neutral may also be mounted on the crossarm.
When the transverse load is more than 750 pounds per pin, construction similar to C2-2R should be used.

ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
a	6	Insulator, pin type	f	6	Pin, crossarm, steel, $\frac{5}{8}$ " x 14"
c	4	Bolt, machine, $\frac{5}{8}$ " x req'd. length	g	2	Crossarm, $3\frac{1}{2}$ " x $4\frac{1}{2}$ " x 10'-0"
c	4	Bolt, machine, $\frac{1}{2}$ " x req'd. length	cu	2	Brace, wood, 60" span
d	13	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{16}$ " hole	n	2	Bolt, double arming, $\frac{5}{8}$ " x req'd. length.
d	4	Washer, round, $1\frac{3}{8}$ " dia., $\frac{9}{16}$ " hole	da	1	Bracket, insulated
d	6	Washer, 3 " x 3 " x $\frac{1}{4}$ ", $\frac{1}{16}$ " hole	14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR CROSSARM CONSTRUCTION - 5° TO 30° ANGLE		
			Scale: $\frac{1}{8}$ " = 1'-0"		
			Date: June 7, '49		
			VC2-1		

NOTE:

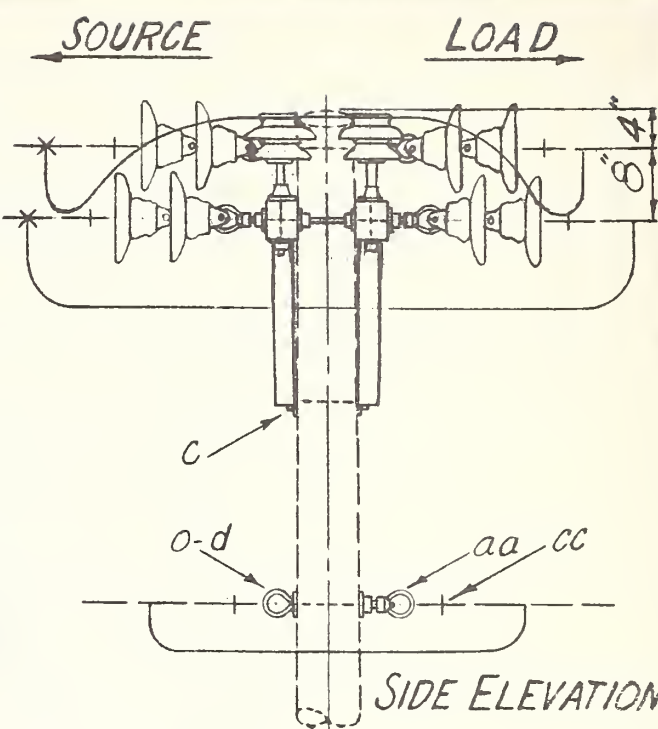
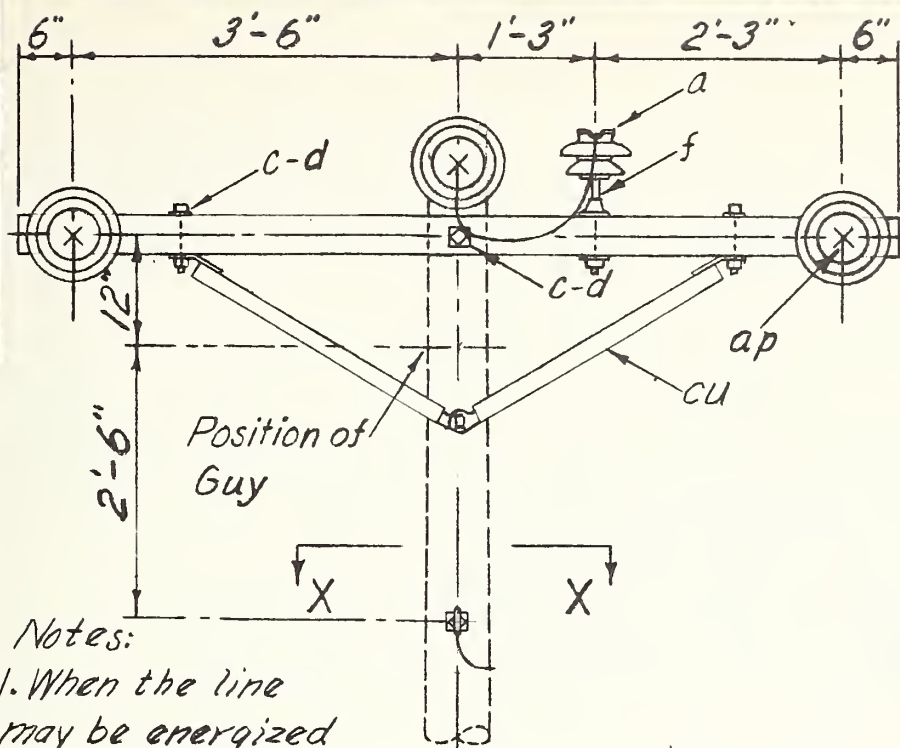
The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.



This assembly may be used for angles 20° to 30° with all conductors, having a breaking strength of 4500 pounds or more. For angles of 10° to 20° arrangement similar to Dwg. *C3-1R may be used.

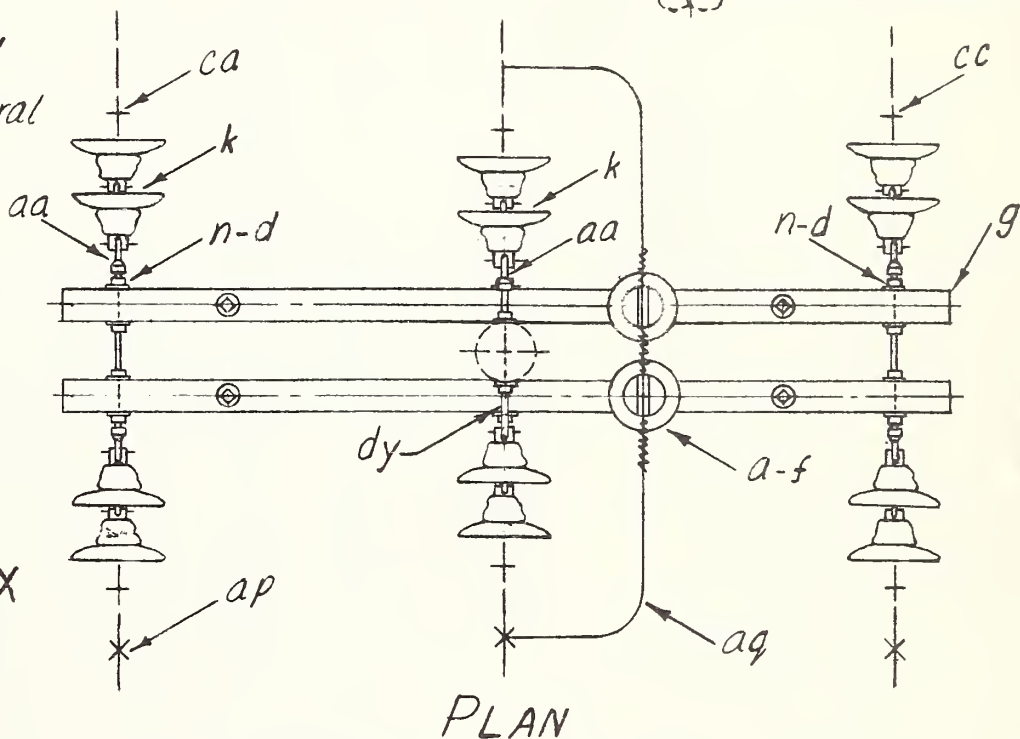
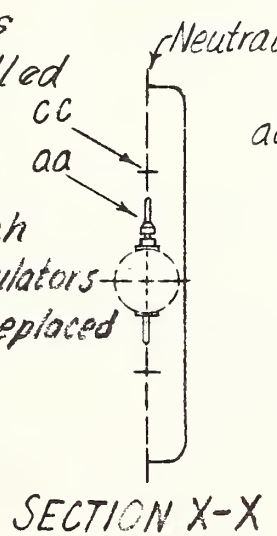
ITEM	No. REQD	MATERIAL	ITEM	No. REQD	MATERIAL
C	1	Bolt, machine, $\frac{5}{8}$ " x reg'd. Lgth.	bo	3	Shackle, anchor
d	4	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole	cd	3	Angle assembly, primary
k	6	Insulator, suspension, 10"	da	1	Bracket, insulated
o	3	Bolt, eye, $\frac{5}{8}$ " x reg'd. length			
<p>14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR VERTICAL CONSTRUCTION-30° TO 60° ANGLE</p> <p>Scale: $\frac{1}{2}$" = 1'-3"</p> <p>Date: June 7, 1945</p> <p>VCS</p>					
No	REVISION		DATE:		

VC4-1



Notes:

1. When the line may be energized from either end, ELEVATION hot line clamps should be installed on both ends of the jumper.
2. The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.



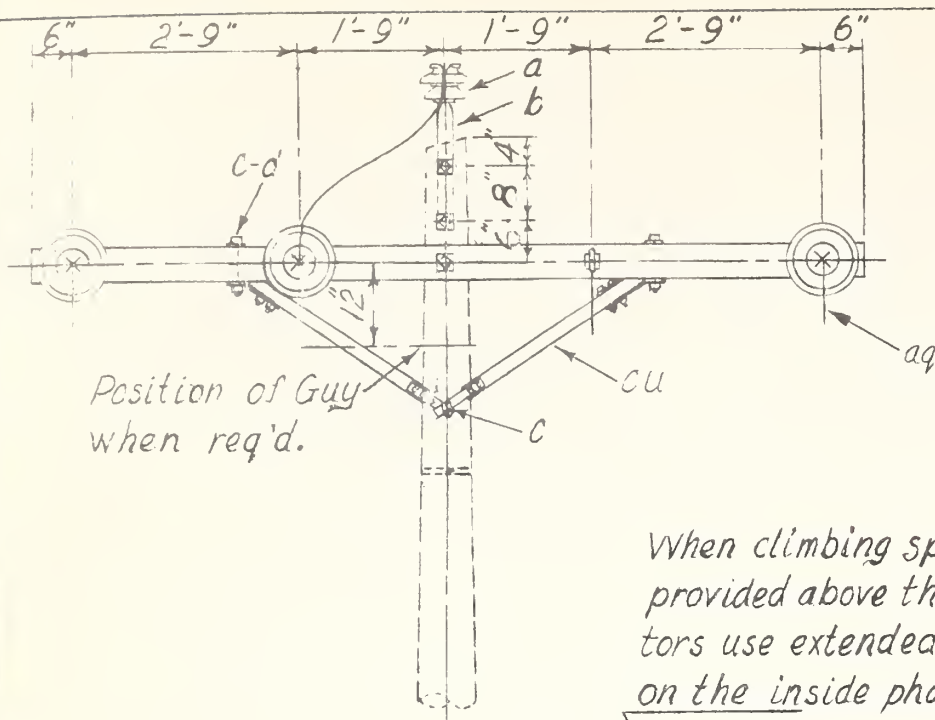
ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
a	2	Insulator, pin type	o	1	Bolt, eye, 5/8" x req'd. length
c	2	Bolt, machine, 5/8" x req'd. length	p		Connectors, as required
c	4	Bolt, machine, 1/2" x req'd. length	aa	6	Nut, eye, 5/8"
d	14	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	ap	3	Clamp, hot line, tap assembly
d	4	Washer, round, 1 3/8" dia., 9/16" hole	aq		Jumpers or leads, as required
f	2	Pin, crossarm, steel, 5/8" x 14"	ca	6	Deadend assembly, primary
g	2	Crossarm, 3 1/2" x 4 1/2" x 8'-0"	cc	2	Deadend assembly, neutral
cu	4	Brace, wood, 60" span	dy	1	Bolt, eye, double arming, 5/8" x req'd. lgth.
k	12	Insulator, suspension, 10"			
n	2	Bolt, double arming, 5/8" x req'd. lgth.			

14.4/24.9KV. PRIMARY, 3-PHASE 4-WIRE STAR CROSSARM CONSTRUCTION, DEADEND (DOUBLE)

Scale: 1/2" = 1'-0"

Date: Mar. 21, 1951

NO.	REVISION	DATE:	VC 8 R
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NOTE:

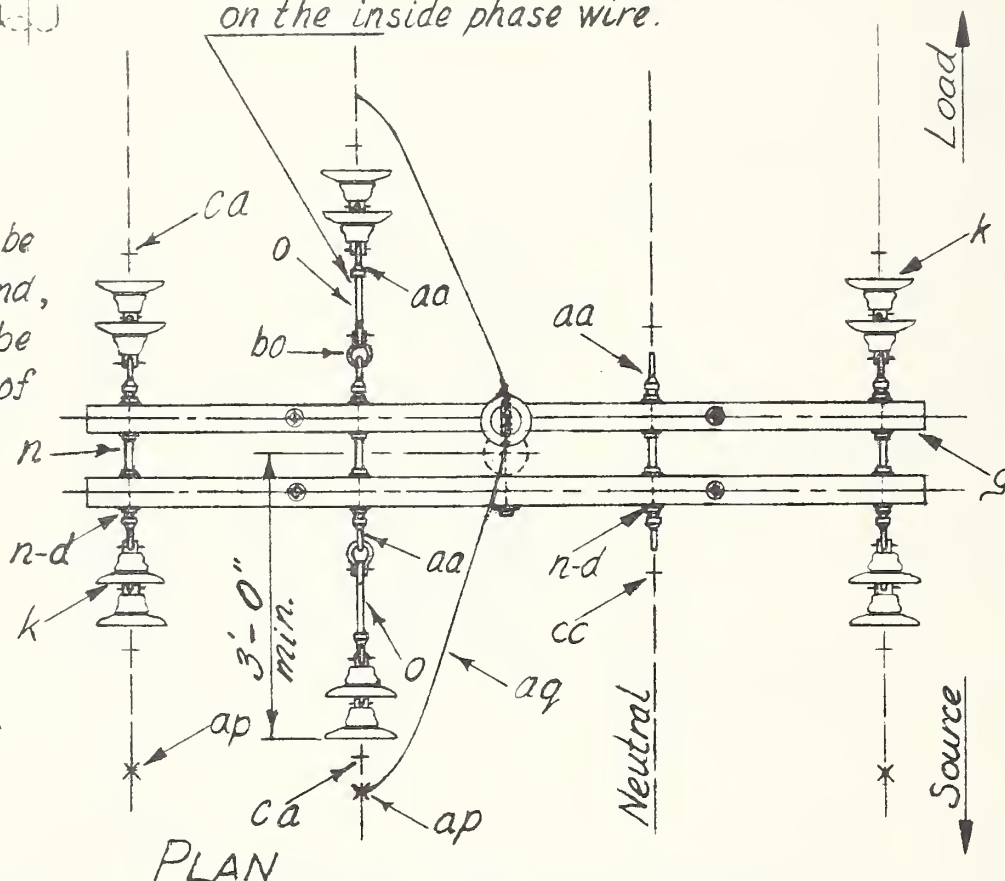
The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.

When climbing space must be provided above these conductors use extended deadends on the inside phase wire.

NOTES:

When the line may be energized from either end, hot line clamps should be installed on both ends of the jumpers.

Where the heavier construction req'd. for larger conductors is desired, specify this assembly unit as VCB-1L and change items in the material list as required.



PLAN

ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
a	1	Insulator, pin type.	n	4	Bolt, double arming, $\frac{5}{8}$ " x req'd. l'gth.
c	4	Bolt, machine, $\frac{5}{8}$ " x req'd. length	p		Connectors, as req'd.
c	4	Bolt, machine, $\frac{1}{2}$ " x req'd. length	aa	10	Nut, eye, $\frac{5}{8}$ "
d	4	Washer, round, $1\frac{3}{8}$ " dia., $\frac{1}{16}$ " hole	ap	3	Clamp, hot line, tap assembly
d	20	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{16}$ " hole	aq		Jumpers or leads as required
b	1	Pin, pole top, 20"	bo	2	Shackle, anchor
g	2	Crossarm, $3\frac{3}{4}$ " x $4\frac{1}{4}$ " x 10'-0"	o	2	Bolt, eye, $\frac{5}{8}$ " x req'd. length
cu	2	Brace, crossarm, wood, 60" span	ca	6	Deadend assembly, primary
k	12	Insulator, suspension, 10"	cc	2	Deadend assembly, neutral

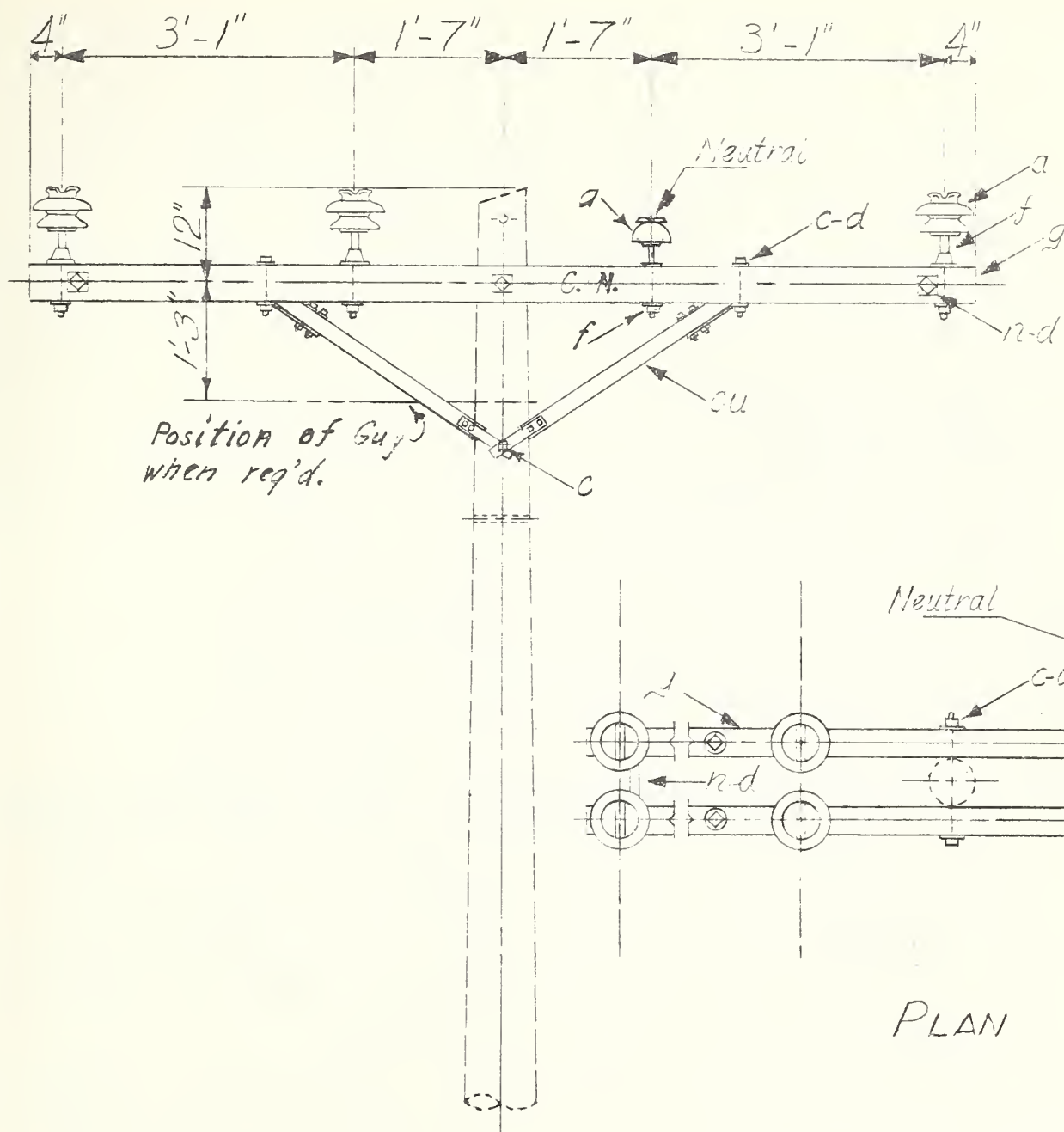
14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
CROSSARM CONSTRUCTION - DEADEND (DOUBLE)

Scale: $\frac{3}{8}$ " = 1'-0"

Date: June 21, '49

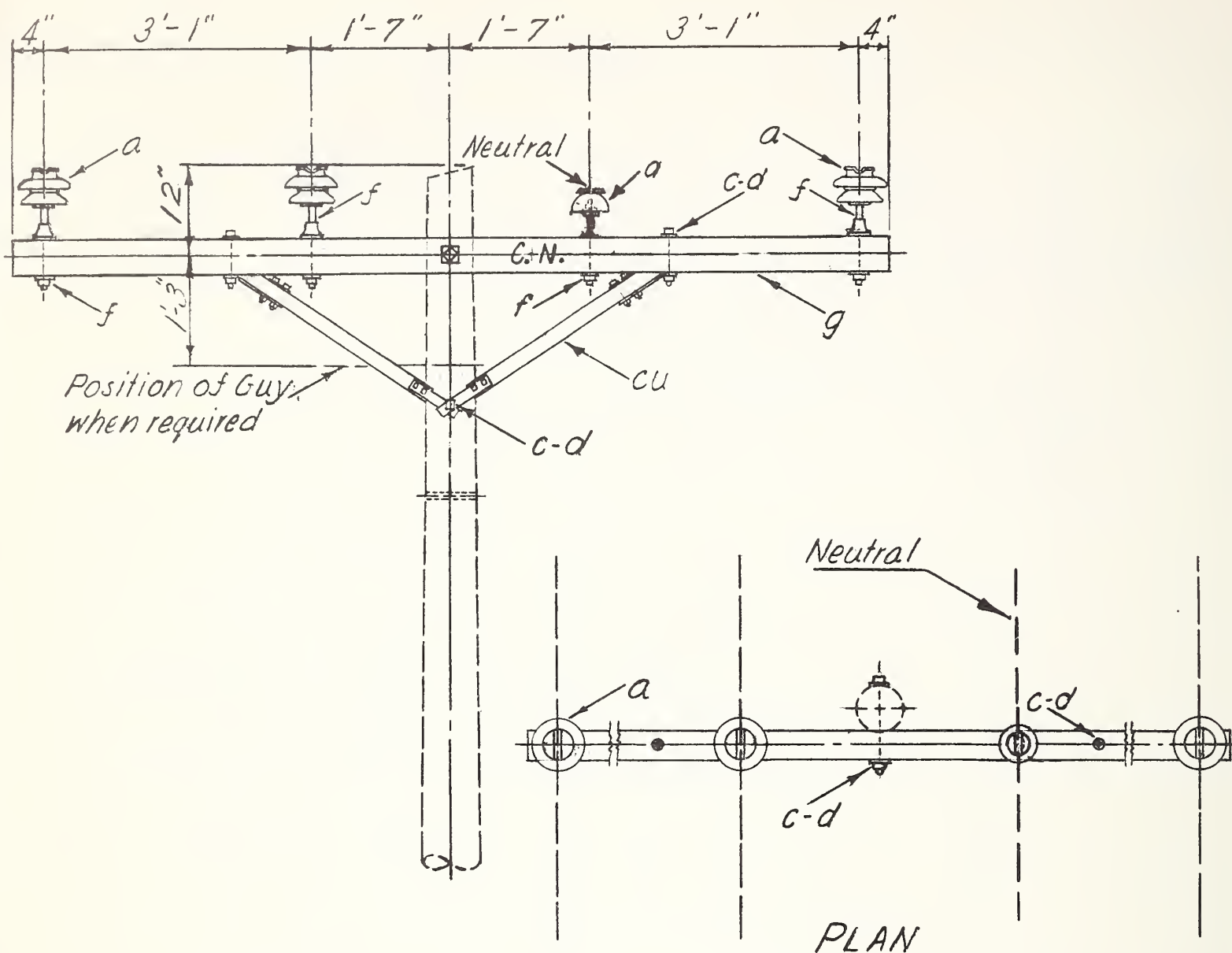
1	Minor changes	7-10-53
No.	REVISION	Date:

VCB-1R

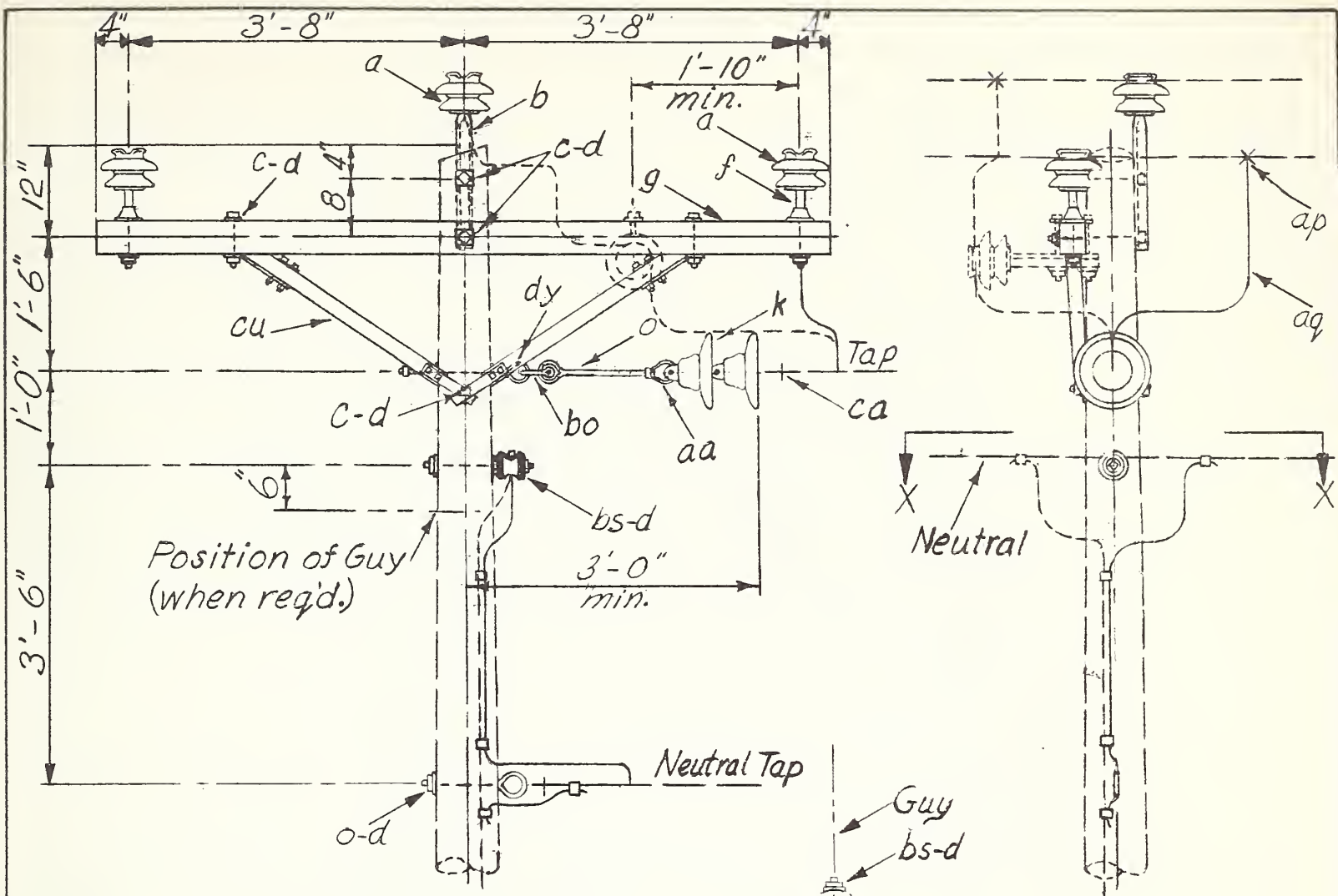


PLAN

ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
a	6	Insulator, pin type.	f	6	Pin, crossarm, steel, $\frac{5}{8}$ " x 14"
c	2	Bolt, machine, $\frac{5}{8}$ " x req'd. length	g	2	Crossarm, $3\frac{3}{4}$ " x $4\frac{3}{4}$ " x 10'-0"
c	4	Bolt, machine, $\frac{1}{2}$ " x req'd. length	cu	2	Brace, crossarm, wood, 60" span
d	10	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{3}{16}$ " hole	n	2	Bolt, double arming, $\frac{5}{8}$ " x req'd. l'gth.
d	4	Washer, round, $1\frac{3}{8}$ " dia., $\frac{9}{16}$ " hole	f	2	Pin, crossarm, steel, $\frac{5}{8}$ " x $10\frac{3}{4}$ "
a	2	Insulator, pin type, 12.5 Kv.	14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR CROSSARM CONSTRUCTION - DOUBLE LINE ARM		
	2	Letters "C.N." 2" with 1" nails			
			Scale: $\frac{1}{2}$ " = 1'-0"		
1	Replace bs with a and f.				Date: June 23, '49
No.	REVISION				VC9
	Date:				



ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
a	3	Insulator, pin type	d	2	Washer, round, 1 ³ / ₈ " dia. ⁹ / ₁₆ " hole
c	2	Bolt, machine, ⁵ / ₈ " x req'd. length	f	3	Pin, crossarm, steel, ⁵ / ₈ " x 14"
c	2	Bolt, machine, 1/2" x req'd. length	g	1	Crossarm, 3 ³ / ₄ " x 4 ³ / ₄ " x 10'-0"
d	3	Washer, 2 ¹ / ₄ " x 2 ¹ / ₄ " x ³ / ₁₆ ", ¹³ / ₁₆ " hole	h	1	Brace, crossarm, wood, 60s span
	2	Letters "C.N." 2" with 1" nails	f	1	Pin, crossarm, steel, ⁵ / ₈ " x 10 ³ / ₄ "
a	1	Insulator, pin type, 12.5 Kv	14.4/24.9 Kv. PRIMARY, 3-PHASE 4-WIRE STAR CROSSARM CONSTRUCTION-SINGLE LINE ARM		
1	Replace bs with a and f		1-6-50		Scale: ¹ / ₂ " = 1'-0"
NO.	REVISION		DATE:		Date: Aug. 1, 1949
					VC9-1



NOTE:

Ground wire to clear all hardware by 2" min. and shall be stapled to maintain this position.

NOTE:

The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators

SECTION X-X

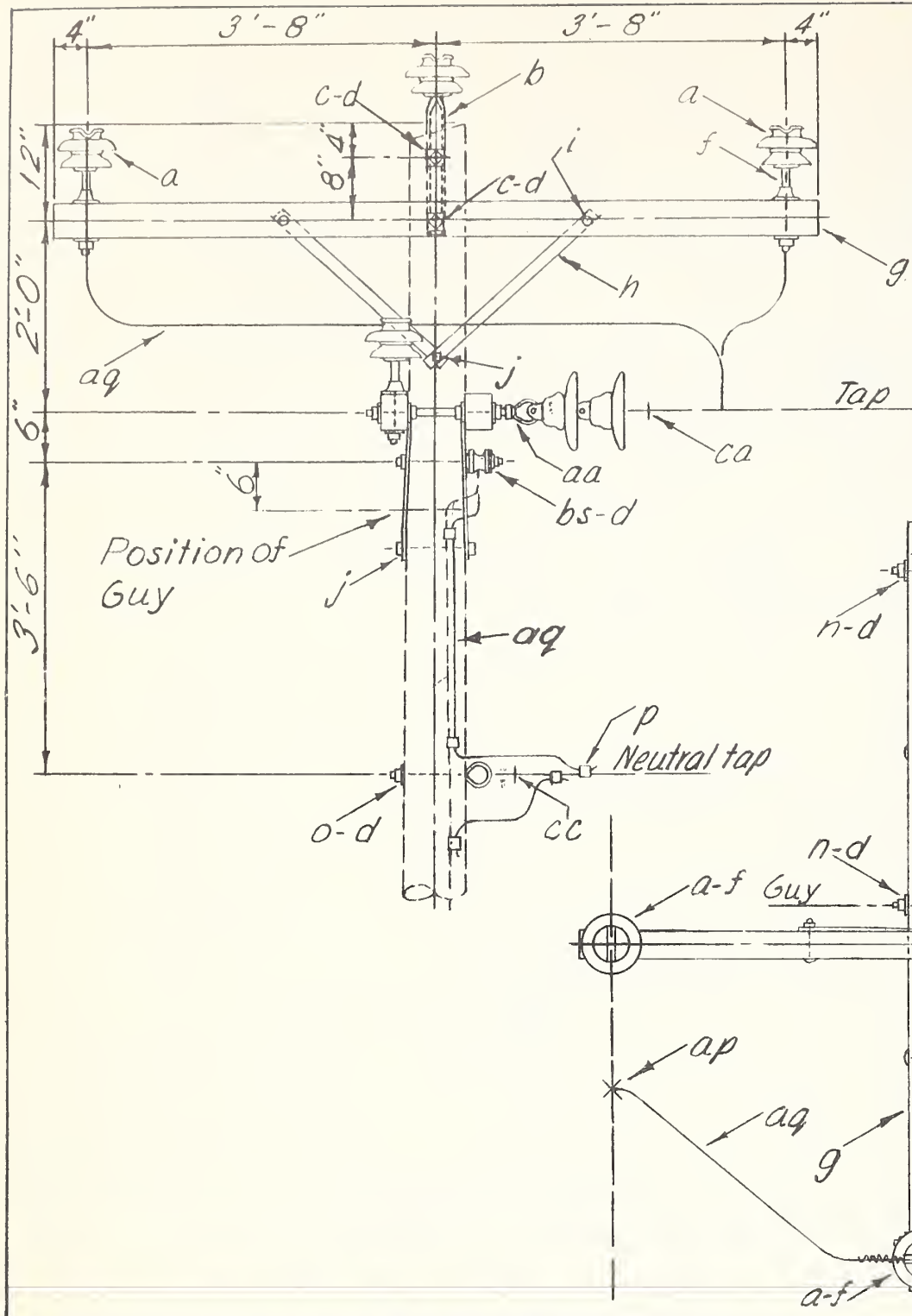
ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
a	3	Insulator, pin type	p		Connectors, as req'd.
b	1	Pin, pole top, 20"	aa	1	Nut, eye, 5/8"
c	3	Bolt, machine, 5/8" x req'd. length	ap	1	Clamp, hot line, tap assembly
d	7	Washer, 2 1/4" x 2 1/4" x 3/16", 1 1/16" hole	aq		Jumpers and leads, as req'd.
f	2	Pin, crossarm, steel, 5/8" x 14"	bo	1	Shackle, anchor
g	1	Crossarm, 3 1/2" x 4 1/2" x 8'-0"	bs	1	Bolt, single upset, insulated
c	2	Bolt, machine, 1/2" x req'd. length	ca	1	Deadend assembly, primary
d	2	Washer, round, 1 3/8" dia., 9/16" hole	cc	1	Deadend assembly, neutral
k	2	Insulator, suspension, 10"	cu	1	Brace, crossarm, wood, 30" span
			dy	1	Bolt, eye, double arming, 5/8"
o	2	Bolt, eye, 5/8" x req'd. length			

14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
CROSSARM CONSTR.-SINGLE PHASE TAP AT 0° TO 5° ANGLE

Scale: 1/2" = 1'-0"

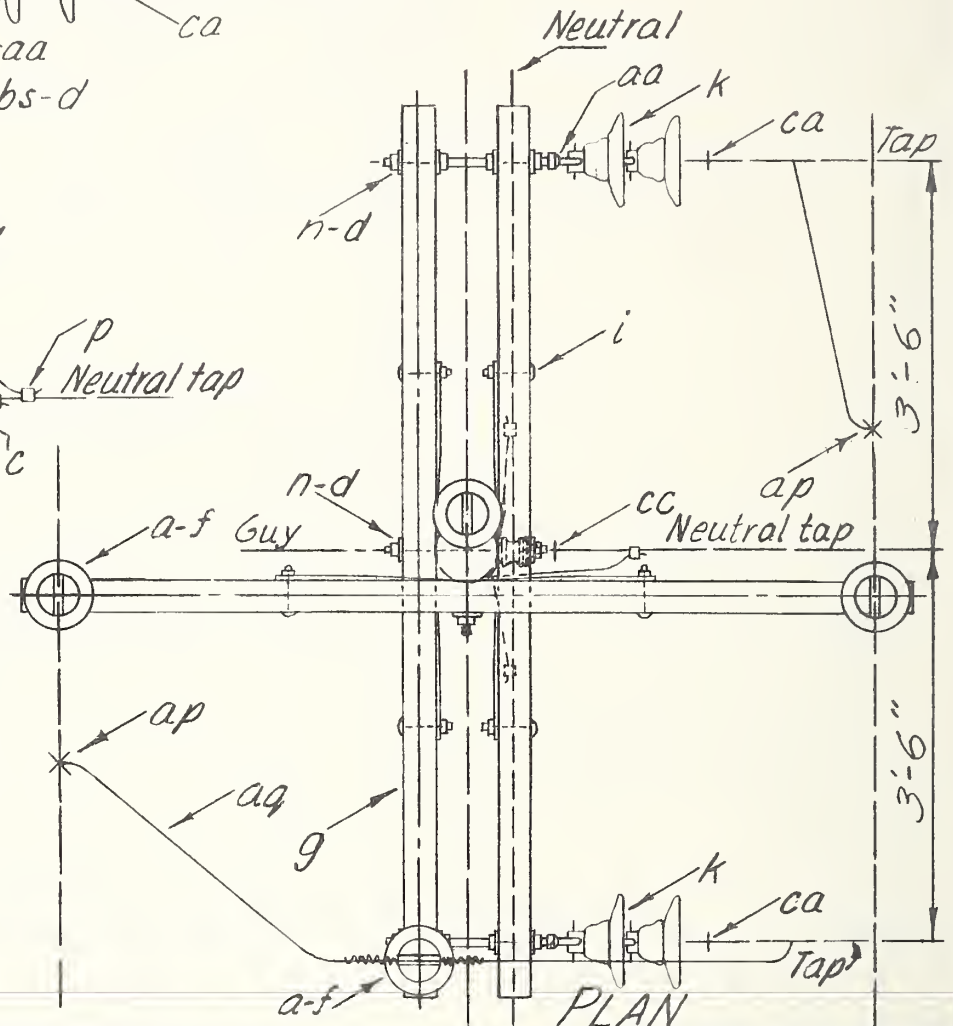
Date: June 17, '49

No.	REVISION	Date:	VC21
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NOTE:

The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.



ITEM	NO. REQ'D.	MATERIAL
a	4	Insulator, pin type
b	1	Pin, pole top, 20"
c	2	Bolt, machine, 5/8" x req'd. length
d	14	Washer, 2 1/4" x 2 1/4" x 3/16", 3/16" hole
f	3	Pin, crossarm, steel, 5/8" x 1 1/4"
g	3	Crossarm, 3 1/2" x 4 1/2" x 8'-0"
h	6	Brace, flat, 1 1/4" x 1/4" x 28"
i	6	Bolt, carriage, 3/8" x 4 1/2"
k	4	Insulator, suspension, 10"
j	3	Screw, 1/2" x 4"

ITEM	NO. REQ'D.	MATERIAL
n	3	Bolt, double arming, 5/8" x req'd. length
o	1	Bolt, eye, 5/8" x req'd. length
p		Connectors, as required
aa	2	Nut, eye, 5/8"
ap	2	Clamp, hot line, tap assembly
aq		Jumpers
bs	1	Bolt, single upset, insulated
ca	2	Deadend assembly, primary
cc	1	Bolt, single upset, insulated

14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
CROSSARM CONSTRUCTION 2-PHASE TAP AT 0° TO 5° ANGLE

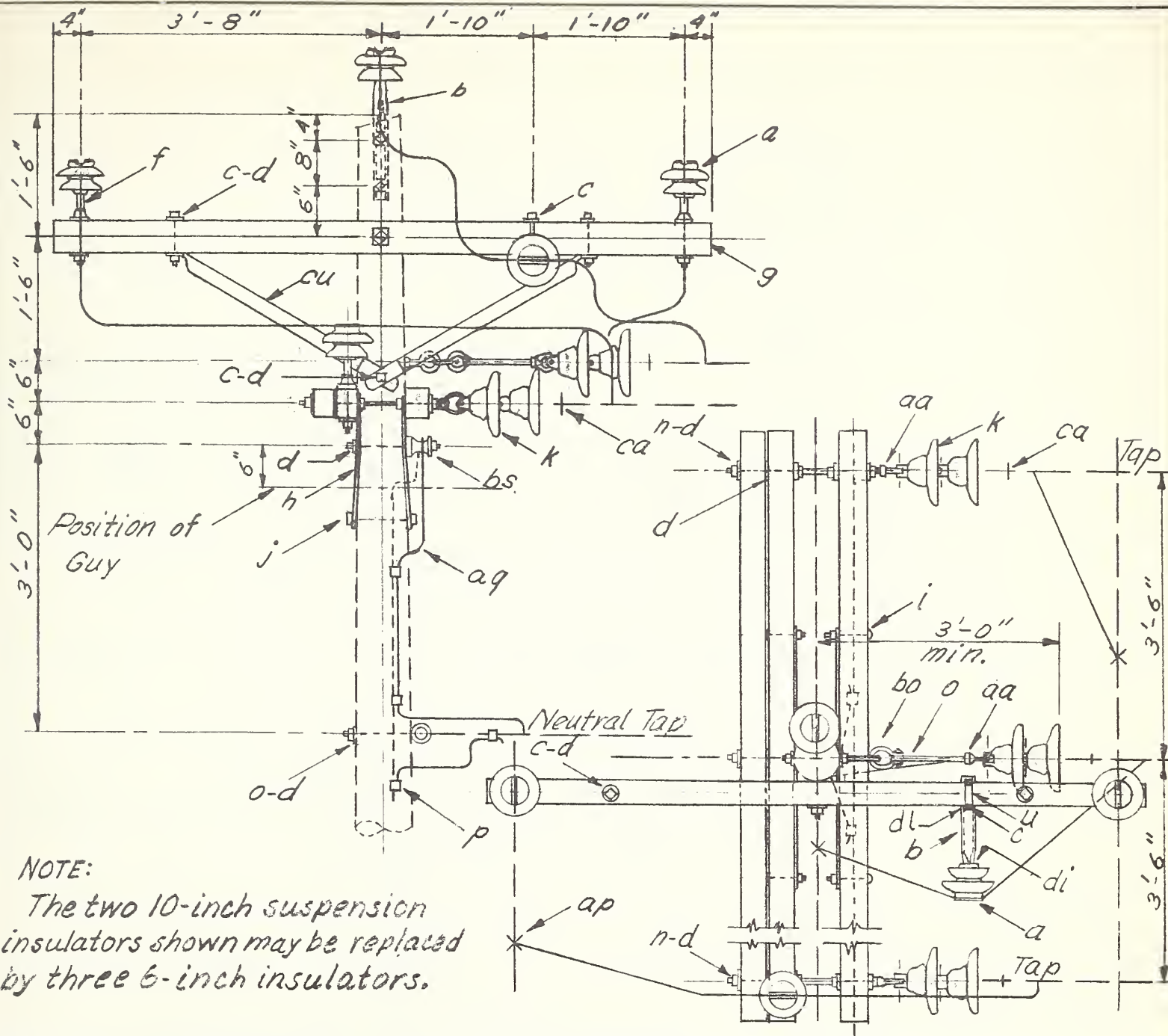
Scale: 1/2" = 1'-0"

Date: Aug. 25, 1949

NO. REVISION

DATE:

VC 23



ITEM	NO. REQ'D	MATERIAL	ITEM	NO. REQ'D	MATERIAL
a	5	Insulator, pin type	o	3	Bolt, eye, 5/8" x req'd. length
b	1	Pin, pole top, 15"	p		Connectors, as req'd.
b	1	Pin, pole top, 20"	u	1/2	Clamp, guy, 3-bolt, 6" long
c	2	Bolt, machine, 1/2" x req'd length	aa	3	Nut, eye, 5/8"
c	6	Bolt, machine, 5/8" x req'd length	ap	3	Clamp, hot line, tap assembly
d	2	Washer, rd., 1 3/8" dia, 9/16" hole	ag		Jumpers and leads, as req'd.
d	22	Washer, 2 1/4" x 2 1/4" x 3/16", 1 3/16" hole	bo	1	Shackle, anchor
f	3	Pin, crossarm, steel, 5/8" x 14"	bs	1	Bolt, single upset, insulated
g	4	Crossarm, 3 1/2" x 4 1/2" x 8'-0"	ca	3	Deadend assembly, primary
h	4	Brace, flat, 1 1/4" x 1/4" x 28"	cc	1	Deadend assembly, neutral
i	4	Bolt, carriage, 3/8" x 4 1/2"	cu	1	Brace, crossarm, wood, 60" span
j	2	Screw, lag, 1/2" x 4"	di	1	Adapter, thimble, 1 3/8" to 1"
k	6	Insulator, suspension, 10"	dl	2	Pipe spacer, pole pin
n	2	Bolt, double arming, 5/8" x req'd lg 1/4"			

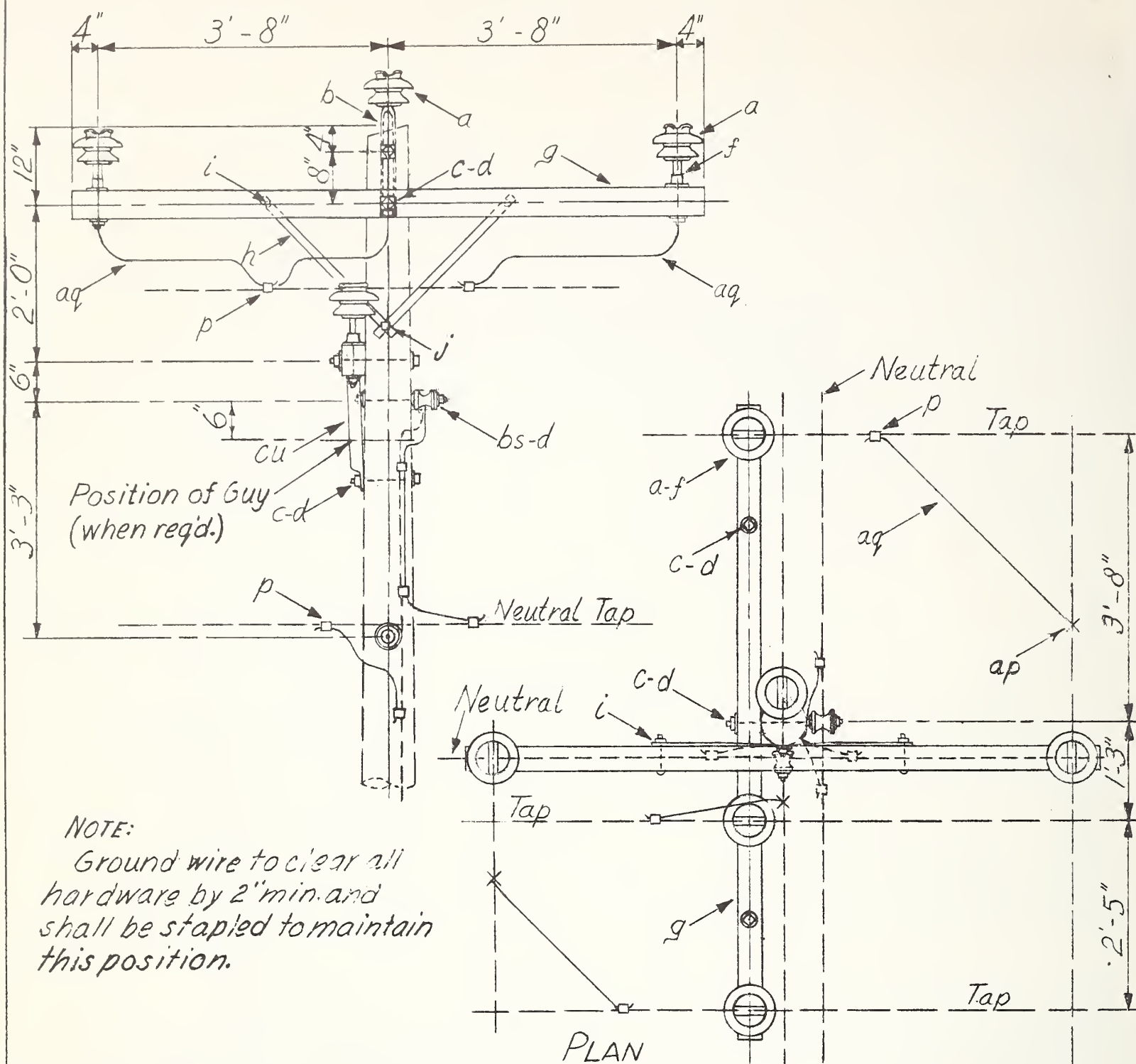
14.4/24.9 KV. PRIMARY, 3 PHASE 4-WIRE STAR
CROSSARM CONSTR. - 3-PHASE TAP AT 0° TO 5° ANGLE

SCALE: 1/2" = 1'-0"

MAY 1, 1951

VC25-1

NO	REVISION	DATE
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ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
a	6	Insulator, pin type	i	2	Bolt, carriage, $\frac{3}{8}$ " x $4\frac{1}{2}$ "
b	1	Pin, pole top, 20"	j	1	Screw, lag, $\frac{1}{2}$ " x 4"
c	4	Bolt, machine, $\frac{5}{8}$ " x req'd. length	p		Connectors, as req'd.
c	2	Bolt, machine, $\frac{1}{2}$ " x req'd. length	ap	3	Clamp, hot line, tap assembly
d	7	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{16}$ " hole	aq		Jumpers and leads, as req'd.
d	2	Washer, round, $1\frac{3}{8}$ " dia., $\frac{9}{16}$ " hole	bs	2	Bolt, single upset, insulated
f	5	Pin, crossarm, steel, $\frac{5}{8}$ " x 14"	cu	1	Brace, crossarm, wood, 60s span
g	2	Crossarm, $3\frac{1}{2}$ " x $4\frac{1}{2}$ " x 8'-0"			
h	2	Brace, $1\frac{1}{4}$ " x $\frac{1}{4}$ " x 28"			

14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
CROSSARM CONSTR.-3-PHASE JUNCTION AT 0° TO 5° ANGLE

Scale: $\frac{1}{2}$ " = 1'-0"

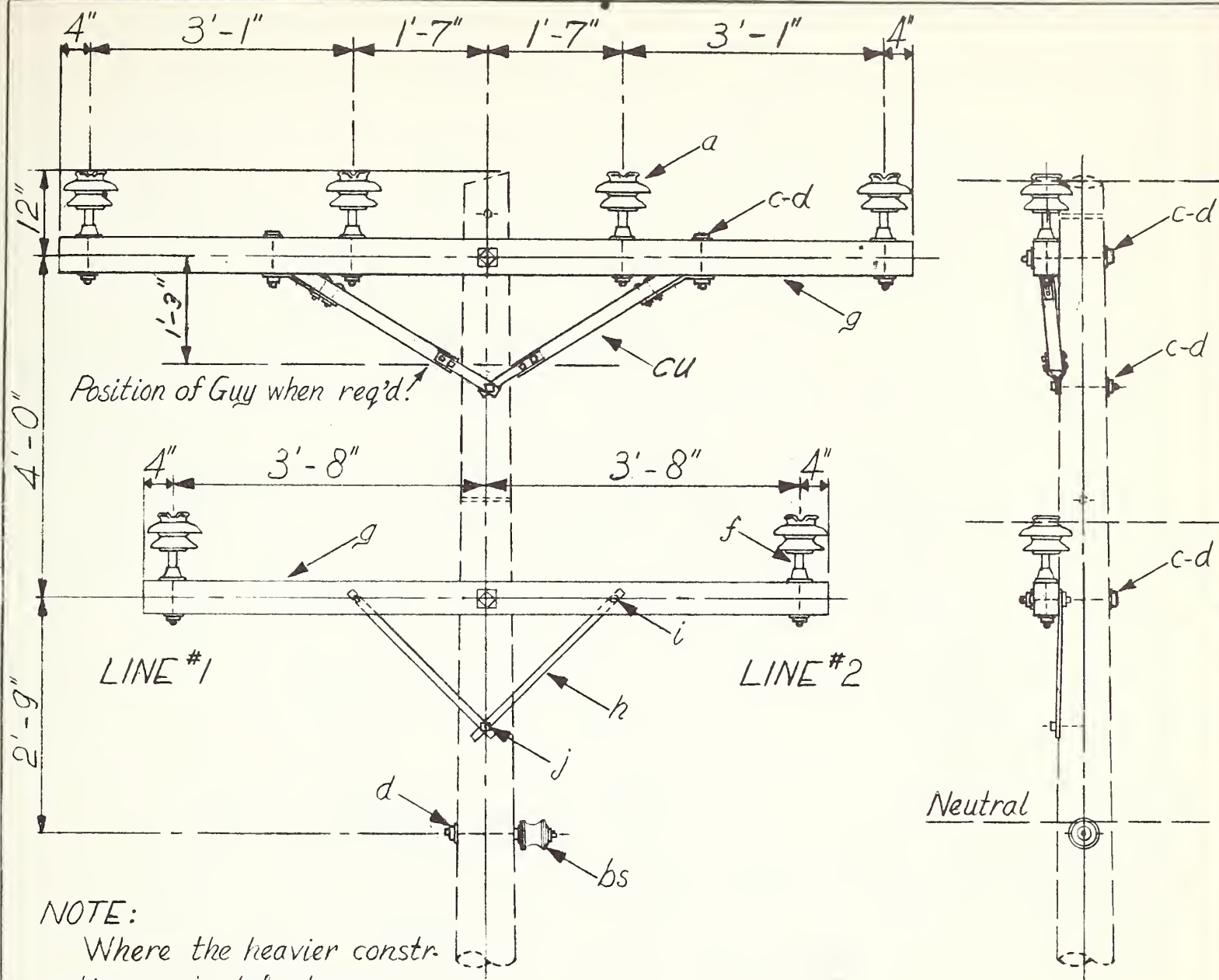
Date: June 15, '49

No.

REVISION

Date:

VC26



ELEVATION

SIDE ELEVATION

ITEM	No. Req'd.	MATERIAL	ITEM	No. Req'd.	MATERIAL
a	6	Insulator, pin type	g	1	Crossarm, $3\frac{1}{2}" \times 4\frac{1}{2}" \times 8'-0"$
c	3	Bolt, machine, $\frac{5}{8}" \times$ req'd. length	cu	1	Brace, wood, 60" span
c	2	Bolt, machine, $\frac{1}{2}" \times$ req'd. length	h	2	Brace, $1\frac{1}{4}" \times \frac{1}{4}" \times 28"$
d	6	Washer, $2\frac{1}{4}" \times 2\frac{1}{4}" \times \frac{3}{16}"$, $\frac{13}{16}"$ hole	i	2	Bolt, carriage, $\frac{3}{8}" \times 4\frac{1}{2}"$
d	2	Washer, $1\frac{3}{8}"$ diam., $\frac{9}{16}"$ hole	j	1	Screw, lag, $\frac{1}{2}" \times 4"$
f	6	Pin, crossarm, steel, $\frac{5}{8}" \times 14"$	bs	1	Bolt, single upset, insulated
g	1	Crossarm, $3\frac{3}{4}" \times 4\frac{3}{4}" \times 10'-0"$			

14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
SINGLE PRIMARY SUPPORT AT 0° TO 5° ANGLE

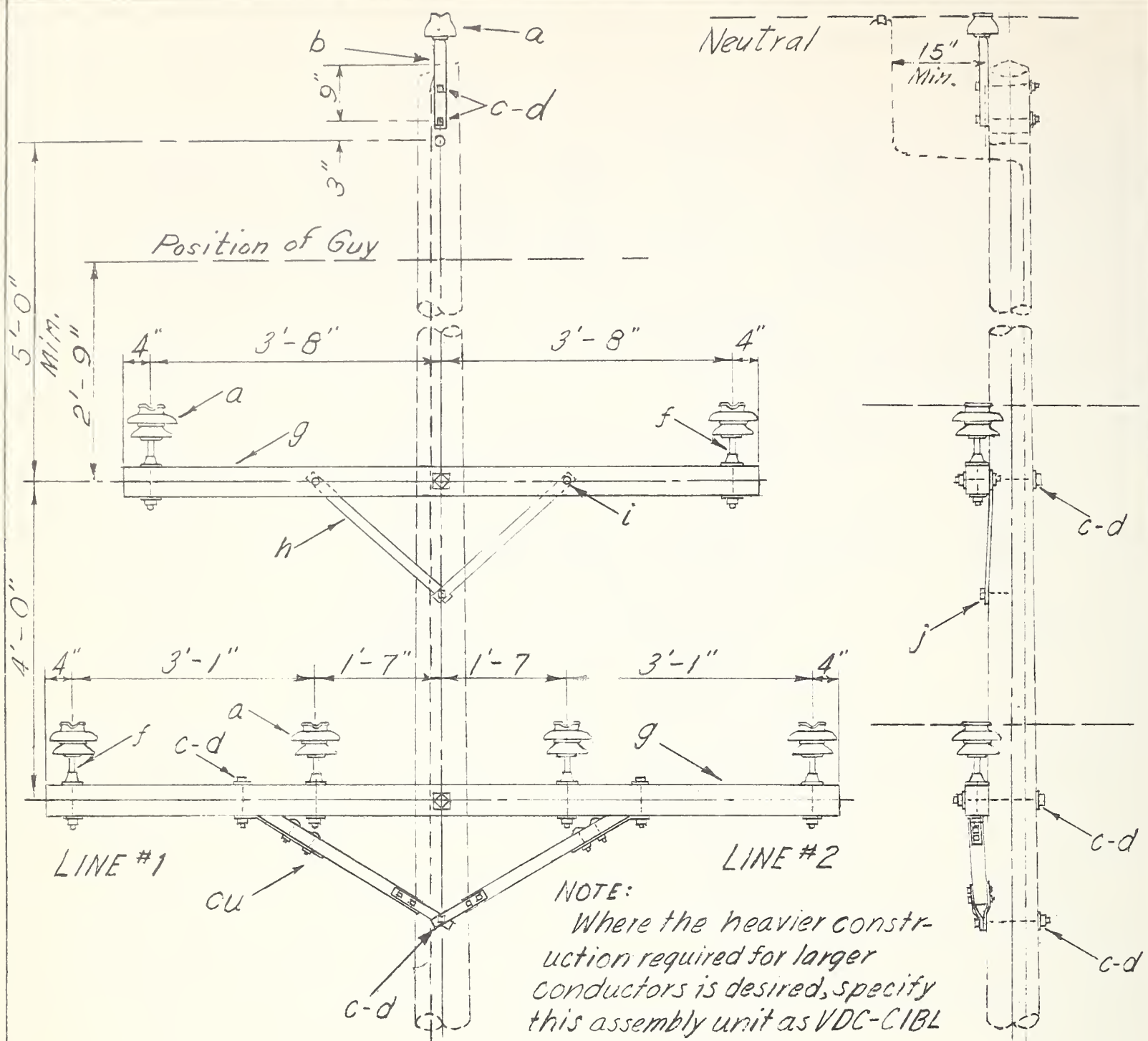
Scale: $\frac{1}{2}" = 1'-0"$

2 X - ARM TYPE

Date: June 17, '49

VDC-C1

No. REVISION Date:



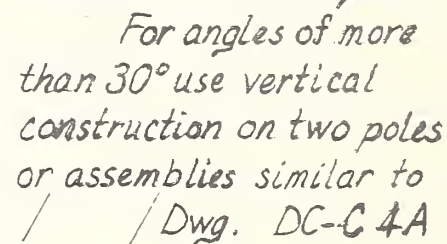
ELEVATION SIDE ELEVATION

ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
a	6	Insulator, pin type,	h	2	Brace, flat, 1 1/4" x 1/4" x 28"
c	5	Bolt, machine, 7/8" x req'd. length	cu	1	Brace, wood, 60" span
c	2	Bolt, machine, 1/2" x req'd. length	i	2	Bolt, carriage, 7/8" x 4 1/2"
d	7	Washer, 2 1/4" x 2 1/4" x 3/16", 9/16" hole	j	1	Screw, lag, 1/2" x 4"
d	2	Washer, Rd. 1 3/8" dia., 9/16" hole	a	1	Insulator, pin type, 12.5 kv.
f	6	Pin, crossarm, steel, 7/8" x 14"	b	1	Pin, pole top, 15"
g	1	Crossarm, 3 3/4" x 4 3/4" x 10'-0"	p		Connectors, as required
g	1	Crossarm, 3 1/2" x 4 1/2" x 8'-0"			

14.4/24.9 KV. PRIMARY, 3 PHASE 4-WIRE STAR
CROSSARM CONSTRUCTION - DOUBLE CIRCUIT
SINGLE PRIMARY SUPPORT WITH OVERHEAD GROUND WIRE

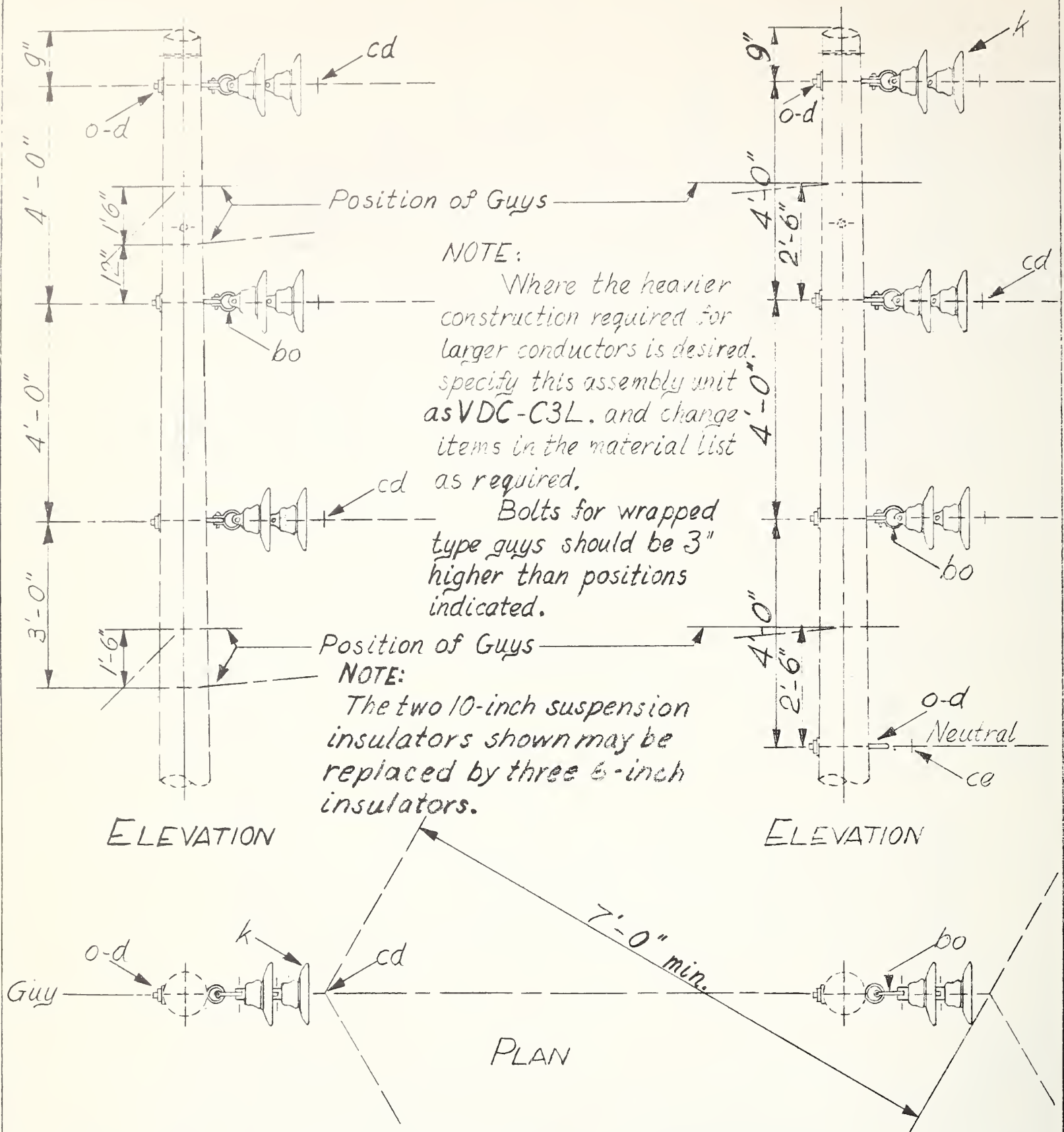
Scale: 1/2" = 1'-0"

1	Changed pole top	9-13-57	Date: Aug. 30, 1949
No.	REVISION	DATE:	VDC-CIBR

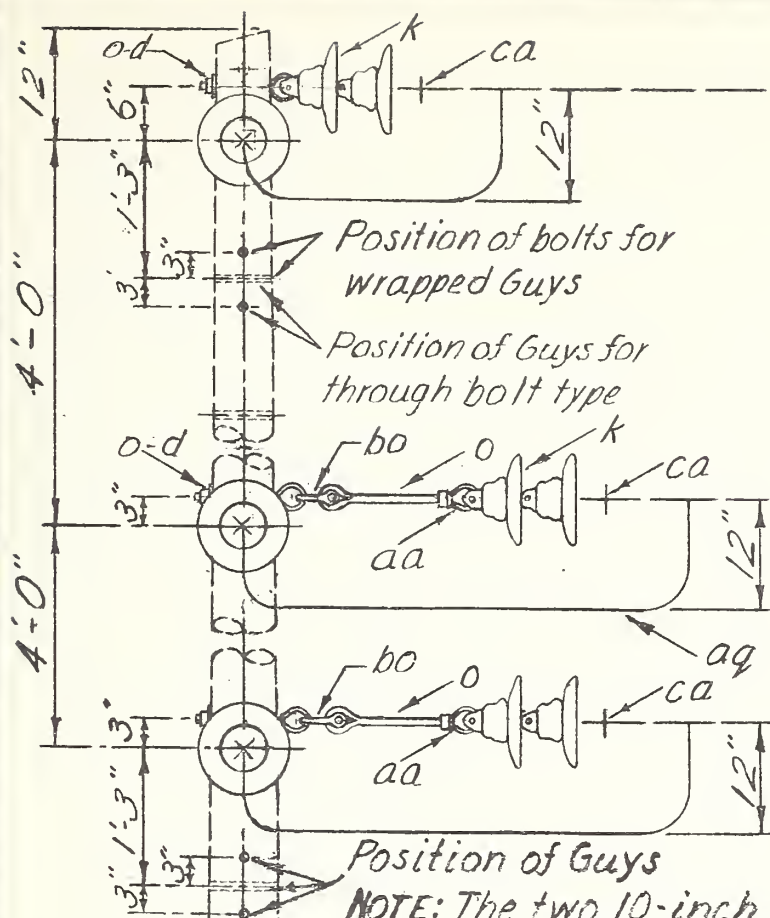


No.	REVISION	Date:
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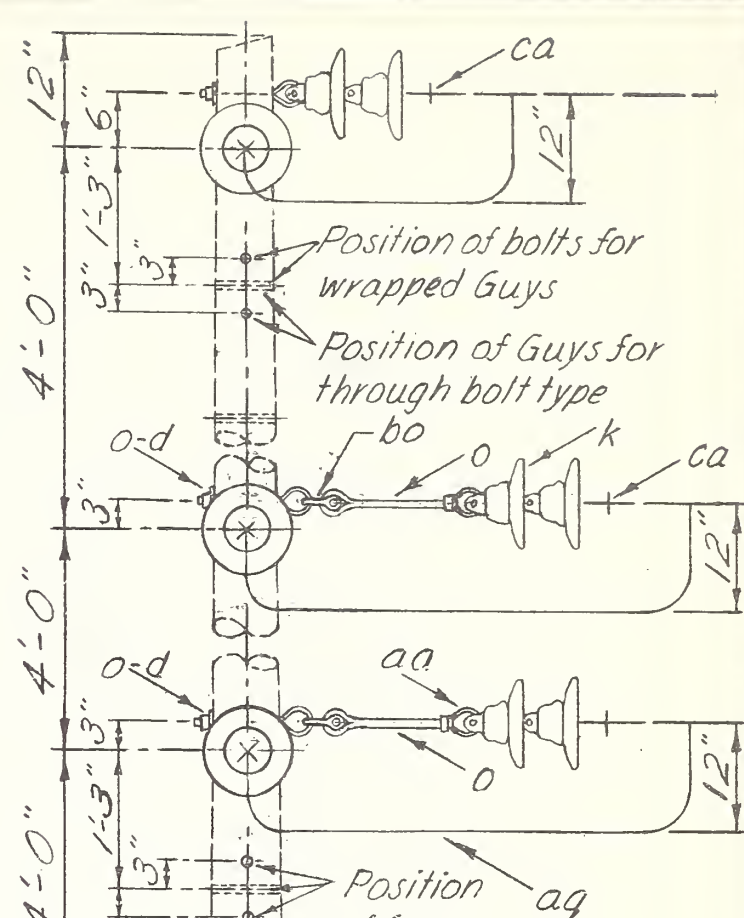
14. 4/24.9KV. PRIMARY, 3-PHASE 4-WIRE STAR
DOUBLE CIRCUIT
CROSSARM CONSTRUCTION - 5° TO 30° ANGLE



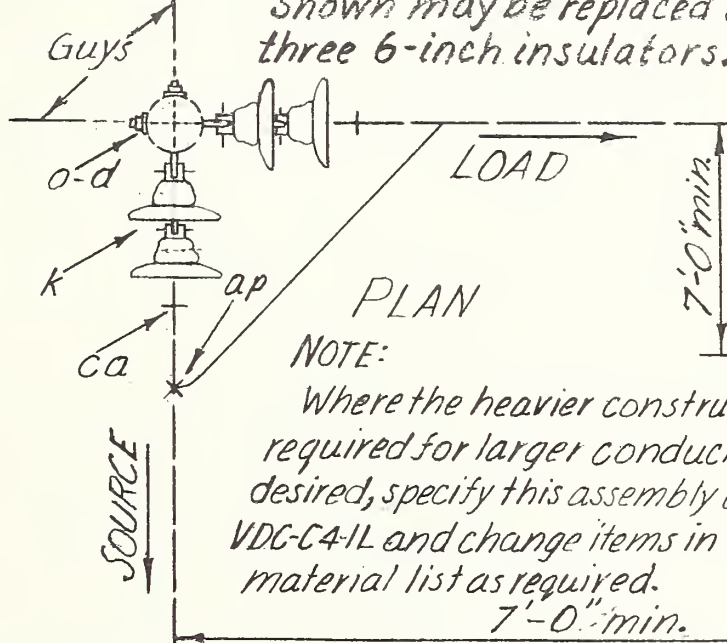
ITEM	No. Reqd.	MATERIAL	ITEM	No. Reqd.	MATERIAL
d	7	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	cd	6	Angle assembly, primary
k	12	Insulator, suspension, 10"	ce	1	Angle assembly, neutral
o	7	Bolt, eye, 5/8" x required length			
bo	6	Shackle, anchor			
			14.4/24.9 KV. PRIMARY, 3 PHASE 4 WIRE STAR		
			DOUBLE CIRCUIT		
			VERTICAL CONSTRUCTION - 30° TO 60° ANGLE		
			Scale: 1/2" = 1'-0"		Date: June 20, '49
No.	REVISION	Date:	VDC-C3		



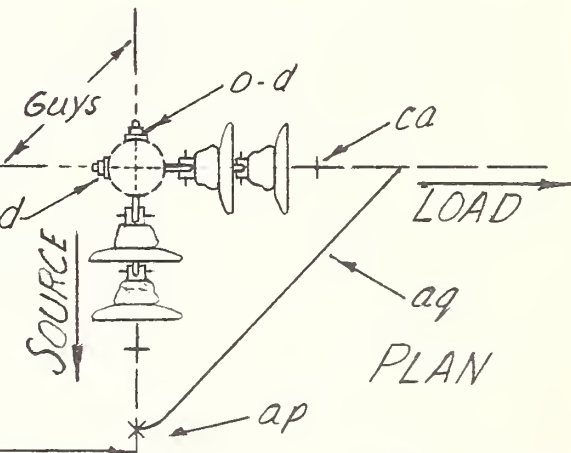
ELEVATION



ELEVATION



PLAN



PLAN

NOTE: The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.

NOTE: Where the heavier construction o-d required for larger conductors is desired, specify this assembly unit as VDC-C4-1L and change items in the material list as required.

ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
d	14	Washer, 2 1/4 x 2 1/4 x 3/16, 13/16" hole	ap	6	Clamp, hot line, tap assembly
k	24	Insulator, suspension, 10"	aq		Jumpers
			bo	8	Shackle, anchor
o	22	Bolt, eye, 5/8 x required length	ca	12	Deadend assembly, primary
p		Connectors, as required	cc	2	Deadend assembly, neutral
aa	8	Nut, eye, 5/8"			

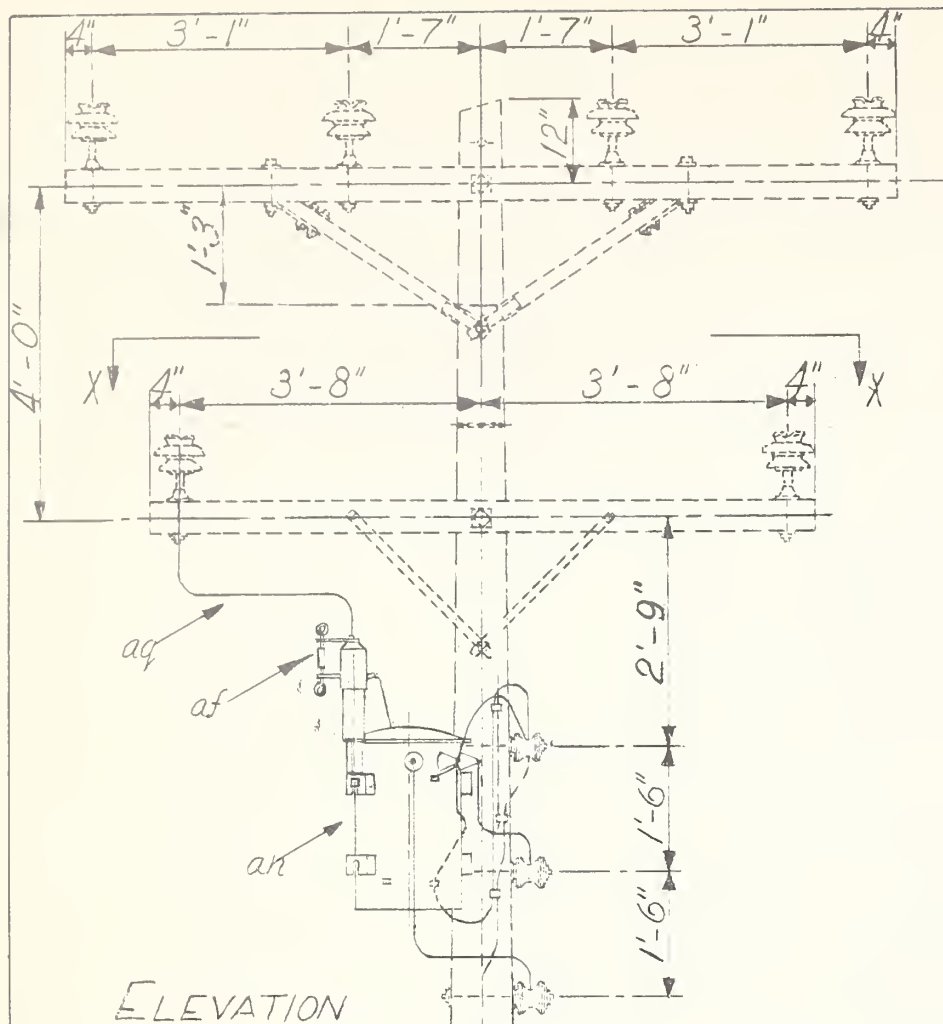
14.4/24.9KV. PRIMARY, 3-PHASE, 4-WIRE STAR
DOUBLE CIRCUIT
VERTICAL CONSTRUCTION 60° TO 90° ANGLE

Scale: 1/2" = 1'-0"

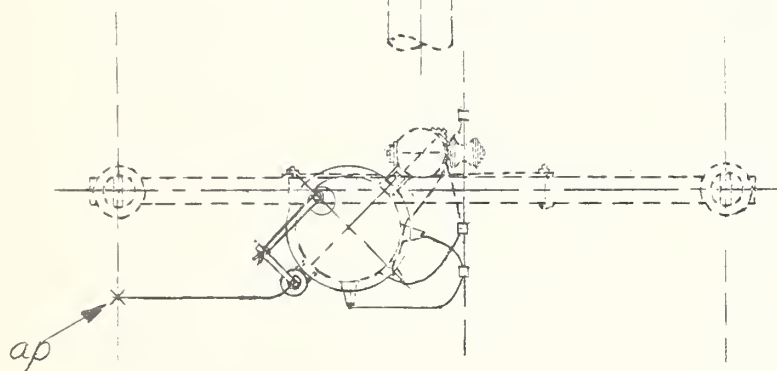
Date: Aug. 3, 1949

NO. REVISION DATE:

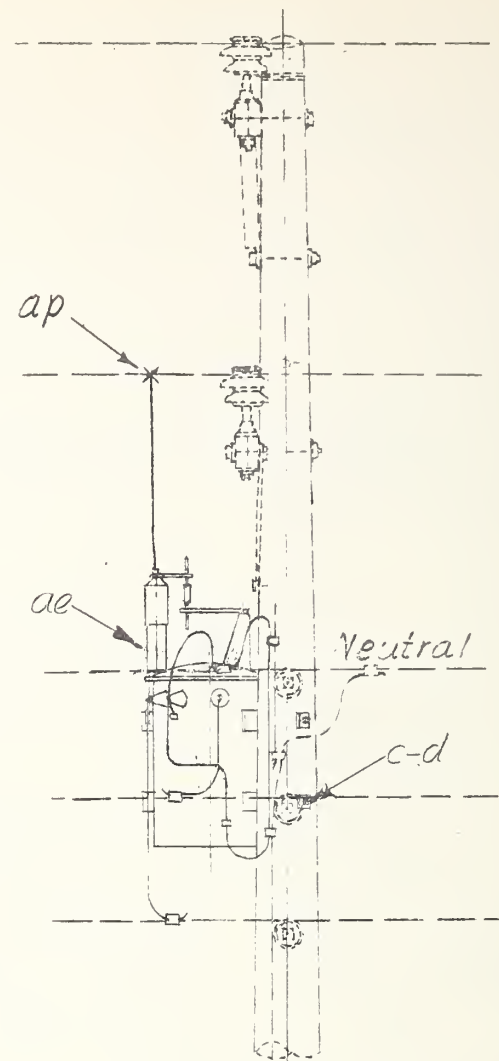
VDC-C4-1



ELEVATION



SECTION X-X



SIDE ELEVATION

NOTE:

When transformer is connected to the other circuit, it should be located on the other side of the pole and the neutral deadended, or transferred to the opposite side.

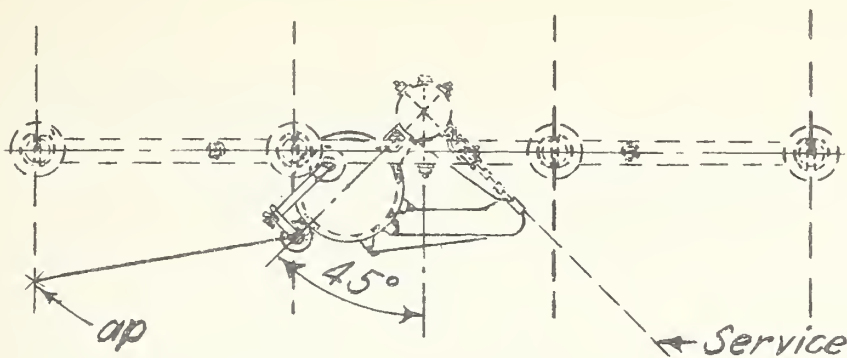
ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
c	2	Bolt, machine, $\frac{5}{8}$ " x req'd. length	an	1	Transformer, conventional
d	2	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole	ap	1	Clamp, hot line, tap assembly
ae	1	Lightning arrester	aq		Leads, #6 S.D. copper or equiv.
af	1	Cutout, fuse, single shot			

14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
DOUBLE CIRCUIT - CONVENTIONAL TRANSFORMER WITH
TANK MOUNTED CUTOUT AND LIGHTNING ARRESTER

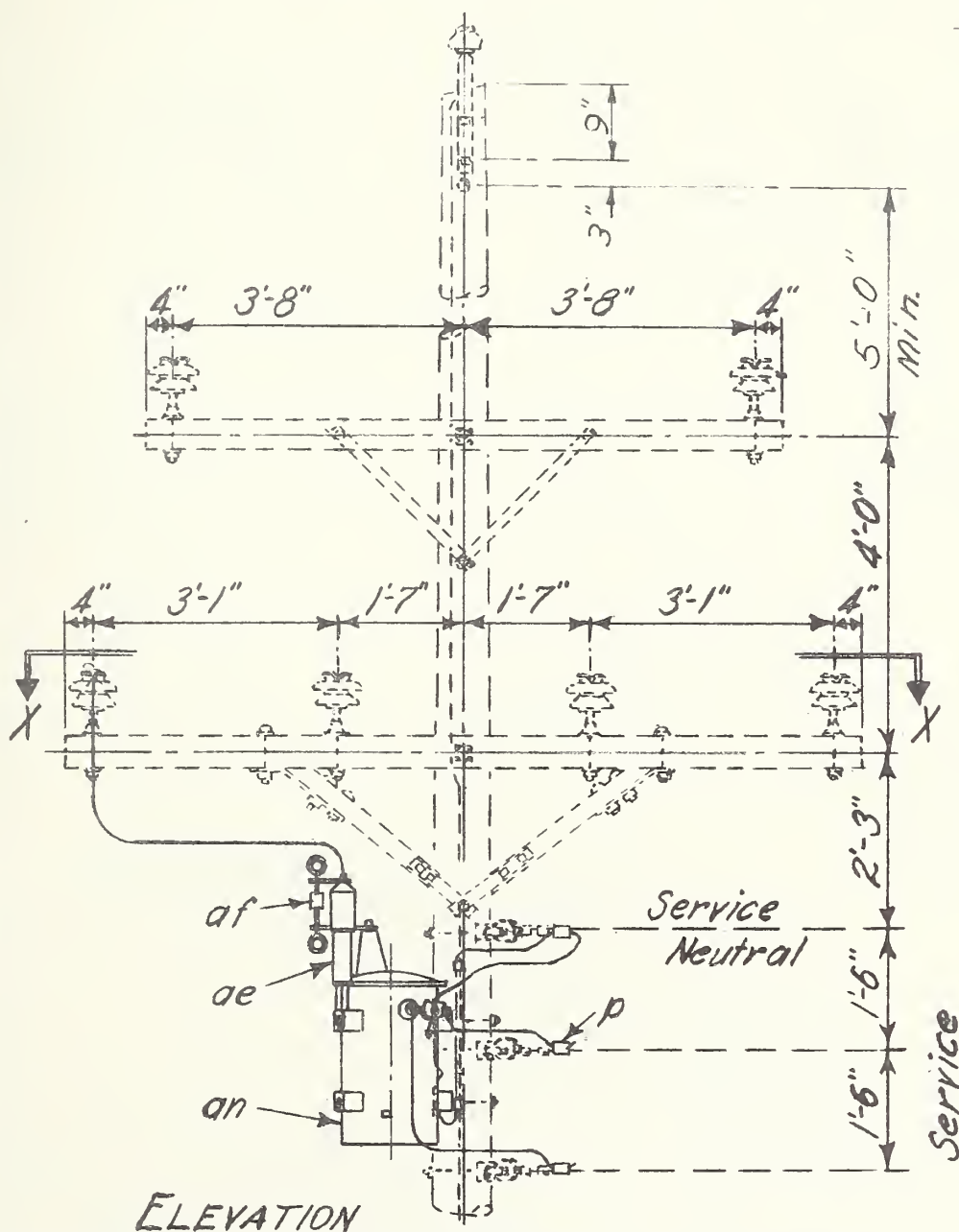
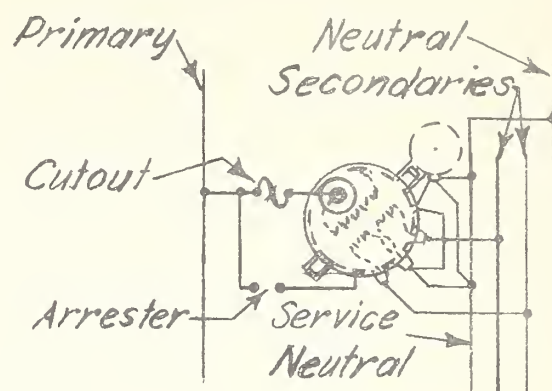
Scale: $\frac{3}{8}$ " = 1'-0"

Date: June 24, 49

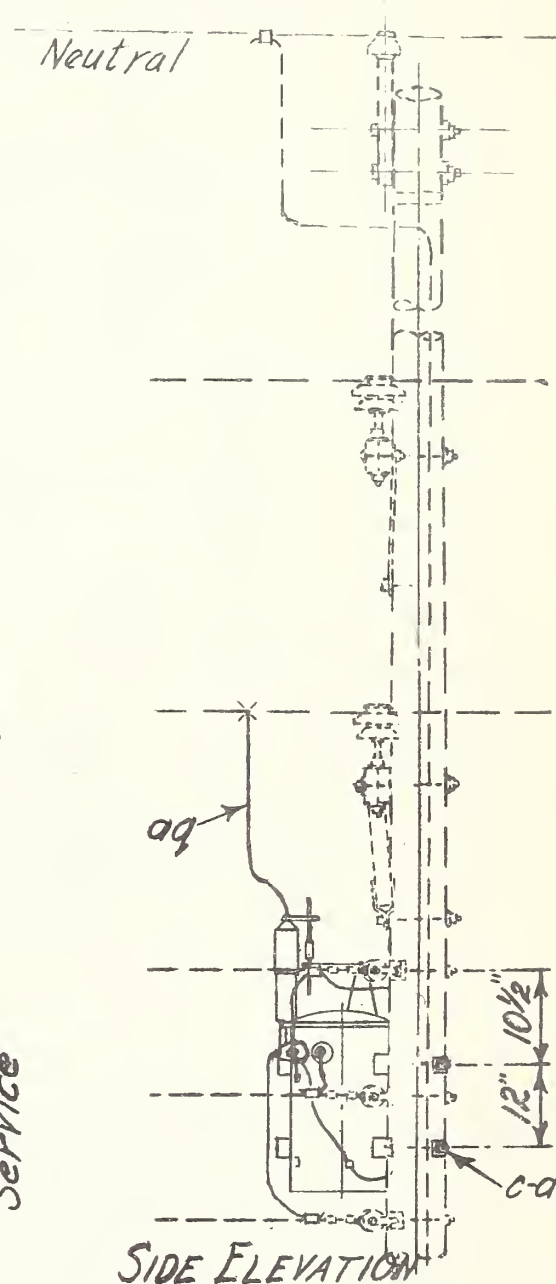
No.	REVISION	Date:	VDC-G39-1 $\frac{1}{2}$
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SECTION X-X



ELEVATION



SIDE ELEVATION

ITEM	No. Req'd.	MATERIAL	ITEM	No. Req'd.	MATERIAL
c	2	Bolt, machine, $\frac{5}{8}$ " x req'd. length	af	1	Cutout, fuse, single shot
d	2	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{16}$ " hole	an	1	Transformer, conventional
p		Connectors, as req'd.	ap	1	Clamp, hot line, tap assembly
ae	1	Lightning arrester	aq		Leads, #6 S.D. copper or equiv.

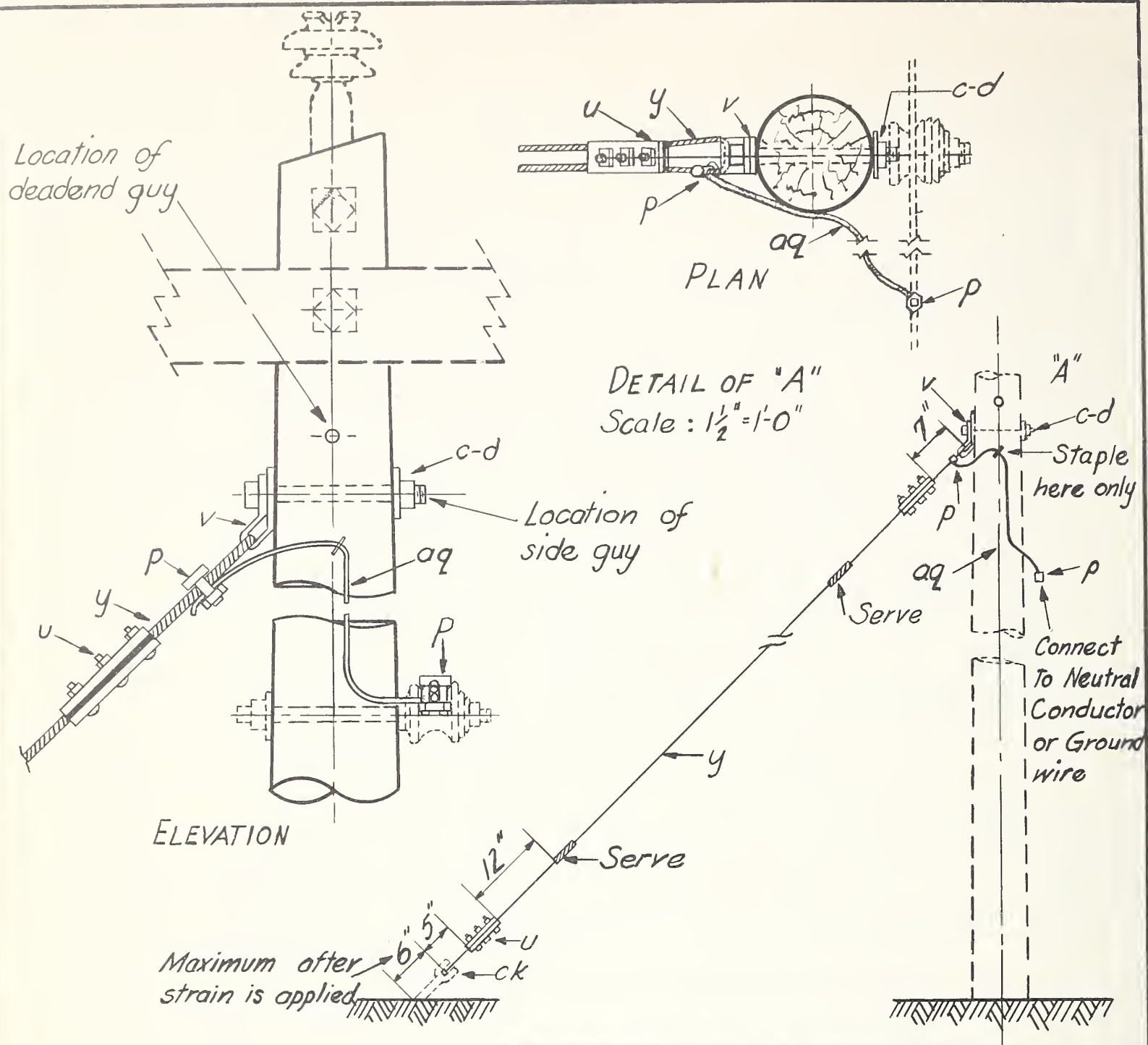
14.4/24.9KV. PRIMARY, 3-PHASE, 4-WIRE STAR
DOUBLE CIRCUIT-CONVENTIONAL TRANSFORMER WITH
TANK MOUNTED CUTOUT AND LIGHTNING ARRESTER

Scale: $\frac{3}{8}$ " = 1'-0"

Date: Oct. 24, '49

1	Pole top and minor changes	9-13-49
No.	REVISION	DATE

VDC-G49-1 1/2



		ASSEMBLY UNIT	
ITEM	MATERIAL	VEI-1 $\frac{1}{4}"$ Guy Wire	VEI-2 $\frac{3}{8}"$ Guy Wire
		No. Req'd.	No. Req'd.
c	Bolt, machine, $\frac{5}{8}"$ req'd. length	1	1
d	Washer, $2\frac{1}{4}" \times 2\frac{1}{4}" \times \frac{3}{16}"$, $\frac{13}{16}"$ hole	1	1
ck	Clamp, anchor rod banding	1	1
u	Clamp, guy, 3-bolt, 6" long	2-Medium Duty	2-Medium Duty
v	Guy attachment	1	1
y	Guy Wire, S-M, 7-Strand	Req'd. Length	Req'd. Length
aq	Jumper, #6 S.D. or equivalent	1	1
p	Connectors, as req'd.	2	2

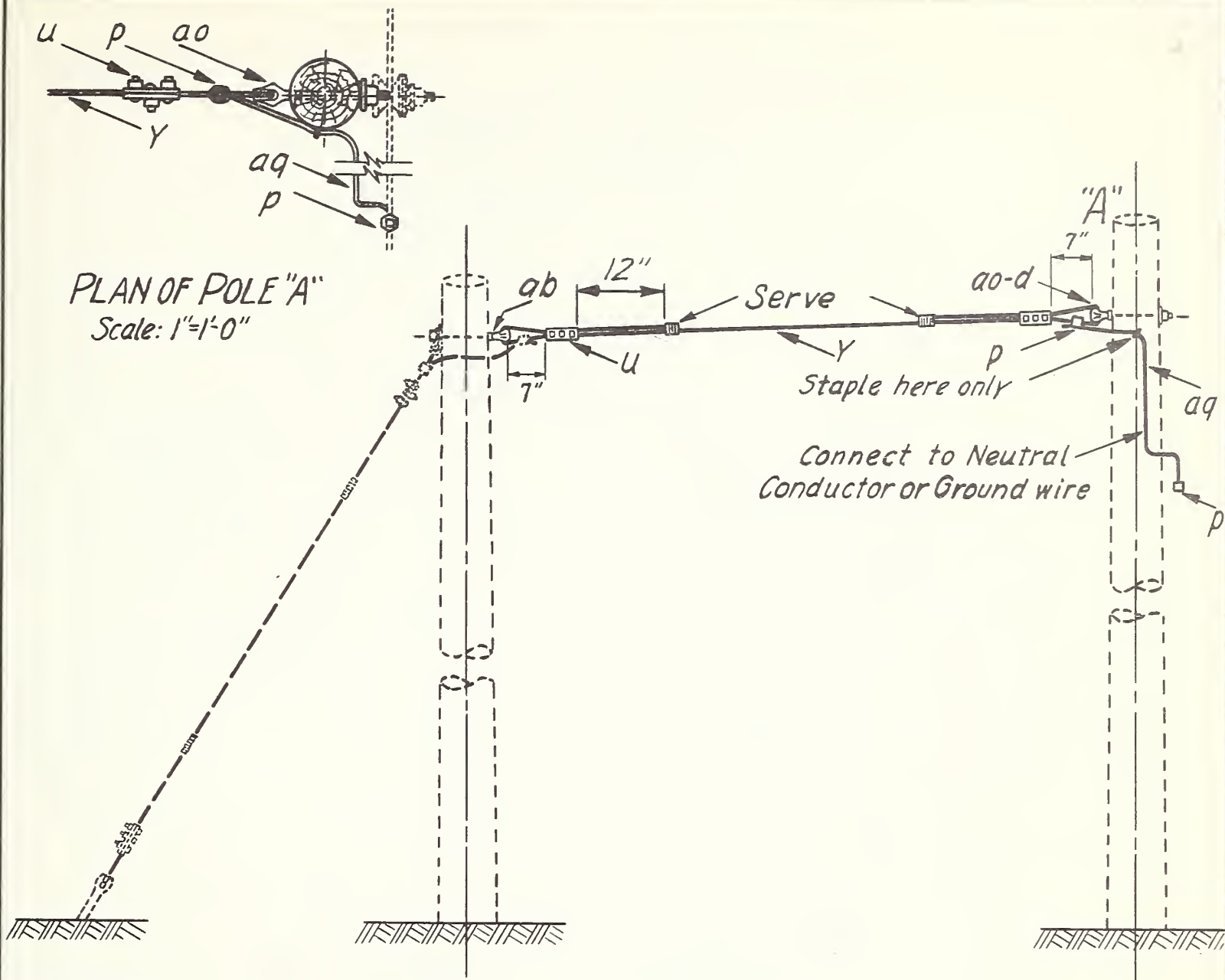
SINGLE DOWN GUY, THROUGH BOLT TYPE

Scale: $\frac{1}{2}" = 1'-0"$

Date: May 18, 1953

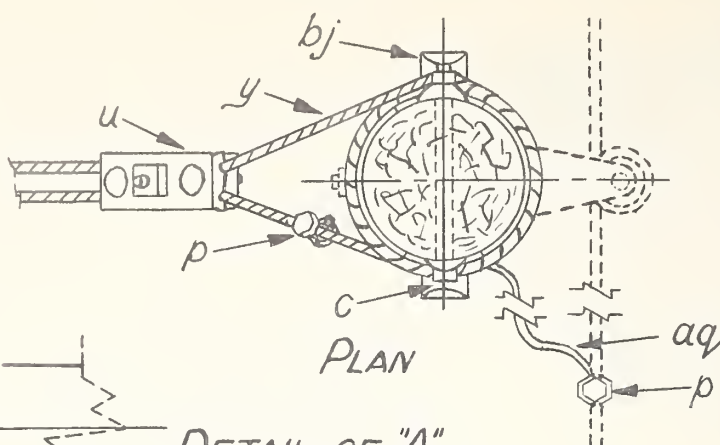
No. REVISION DATE

VEI-1, VEI-2



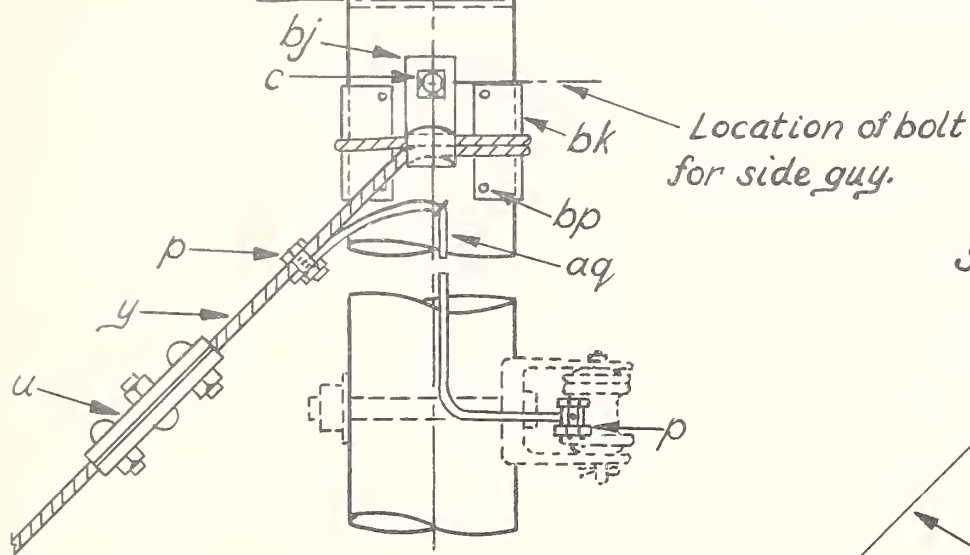
		ASSEMBLY UNIT			
		E2-1 1/4" Guy Wire	E2-2 3/8" Guy Wire		
ITEM	MATERIAL	No REQ'D.	No REQ'D.		
d	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	1	1		
u	Clamp, guy, 3-bolt, 6" long	2-Medium Duty	2-Medium Duty		
ab	Nut, thimble type eye, 5/8"	1	1		
y	Guy Wire, S-M., 7-strand	req'd. length	req'd. length		
ao	Bolt, thimble eye, 5/8" x req'd. length	1	1		
aq	Jumper, #6 S.D. or equivalent	1	1		
p	Connectors, as req'd.	SINGLE OVERHEAD GUY, THROUGH BOLT TYPE			
		Scale: 1/2" = 1'-0"	Date:		
No.	REVISION	DATE:	E2-1, E2-2		

Location of bolt
for deadend guy.



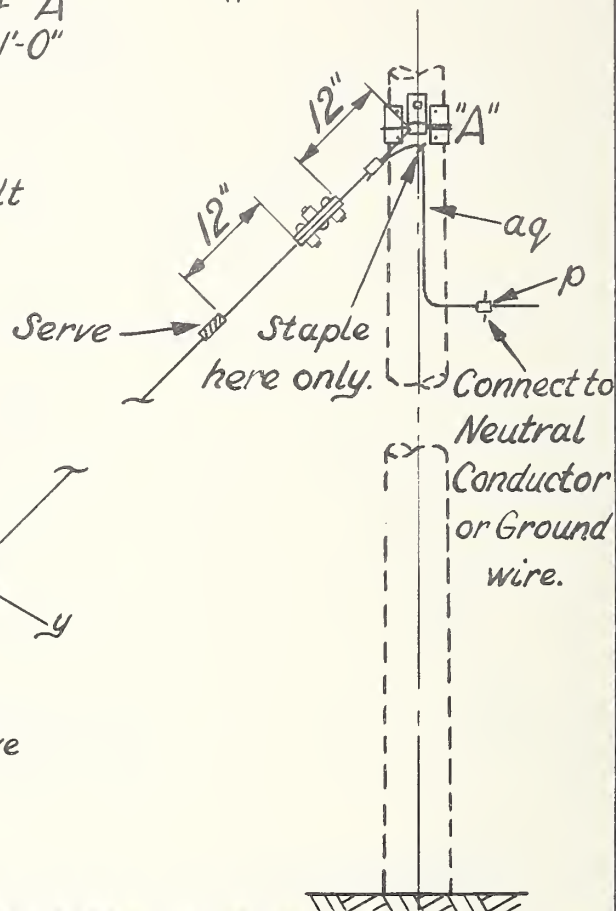
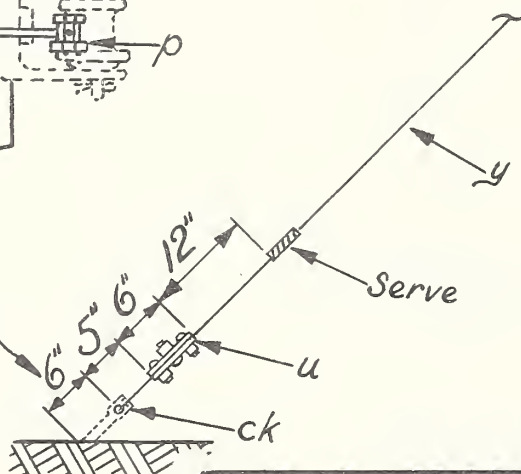
PLAN

DETAIL OF "A"
Scale: 1½"-1'-0"



ELEVATION

Maximum after strain
is applied.



		ASSEMBLY UNIT	
		VE3-2 3/8" Guy Wire	VE3-3 7/16" Guy Wire
ITEM MATERIAL		No. REQ'D.	No. REQ'D.
p	Connectors, as req'd.	2	2
c	Bolt, machine, 5/8" x req'd. length	1	1
u	Clamp, guy, 3 bolt, 6" long	2-Medium Duty	2-Heavy Duty
y	Guy Wire, S-M, T-strand	req'd. length	req'd. length
aq	Jumpers, #6 S.D. or equivalent	1	1
bj	Guy Hook, J	2	2
bk	Guy Plate, 4" x 8", 14 guage	2	2
bp	Nail, 8 penny	8	8
ck	Clamp, anchor rod bonding	1	1

SINGLE DOWN GUY, WRAPPED TYPE

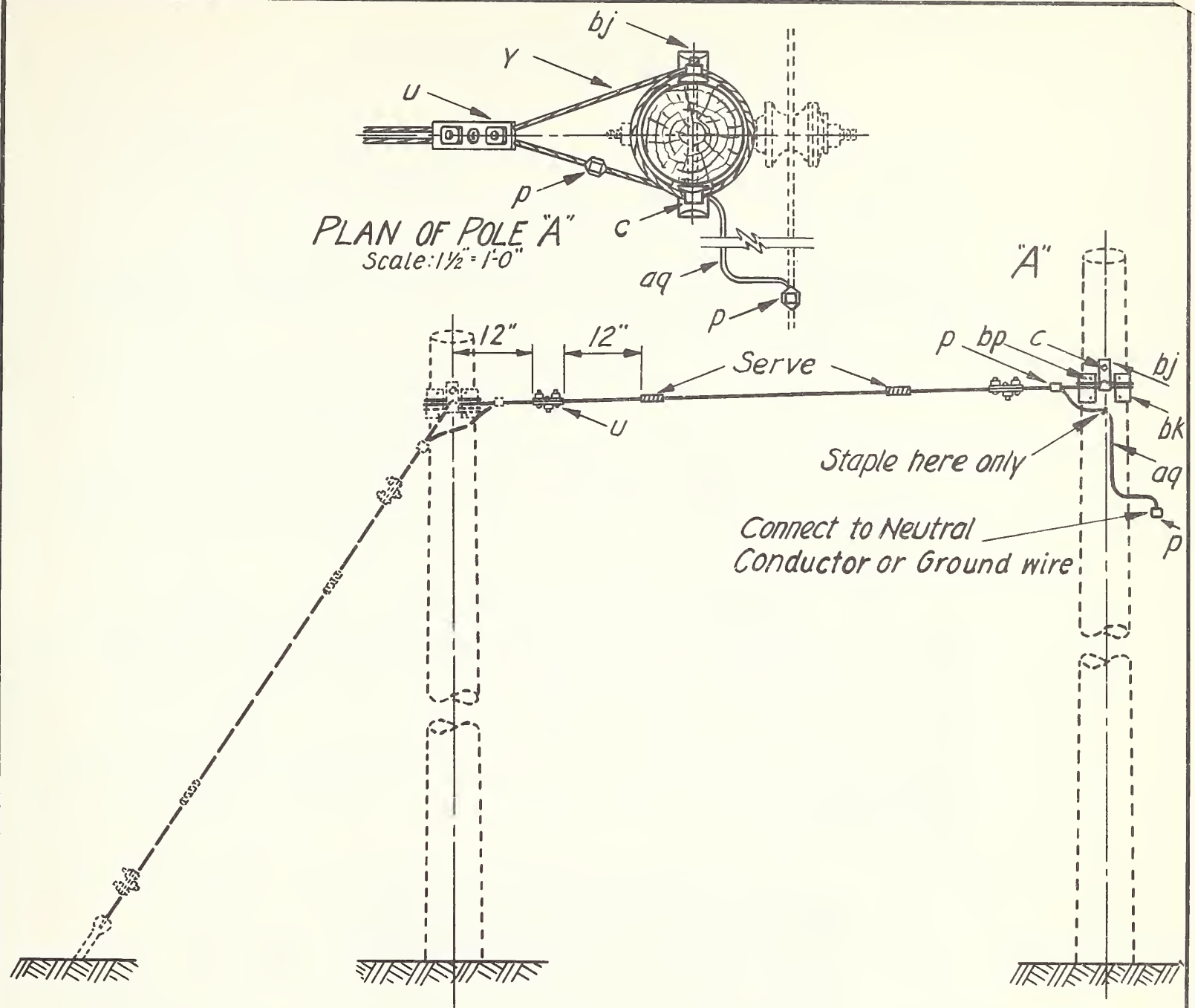
Scale: ½"-1'-0"

Date: May 18, 1953

No. REVISION

DATE:

VE3-2, VE3-3



ASSEMBLY UNIT

ITEM	MATERIAL	ASSEMBLY UNIT	
		E4-2 3/8" Guy Wire	E4-3 7/16" Guy Wire
		No. REQ'D	No. REQ'D.
c	Bolt, machine, 5/8" x req'd. length	1	1
p	Connectors, as req'd.		
U	Clamp, guy, 3-bolt, 6" long	2-Medium Duty	2-Heavy Duty
Y	Guy Wire, S-M, 7-strand	req'd. length	req'd. length
aq	Jumper, #6 S.D. or equivalent	1	1
bj	Guy Hook, J	2	2
bk	Guy Plate, 4"x8", 14 gauge	2	2
bp	Nail, 8 penny	8	8

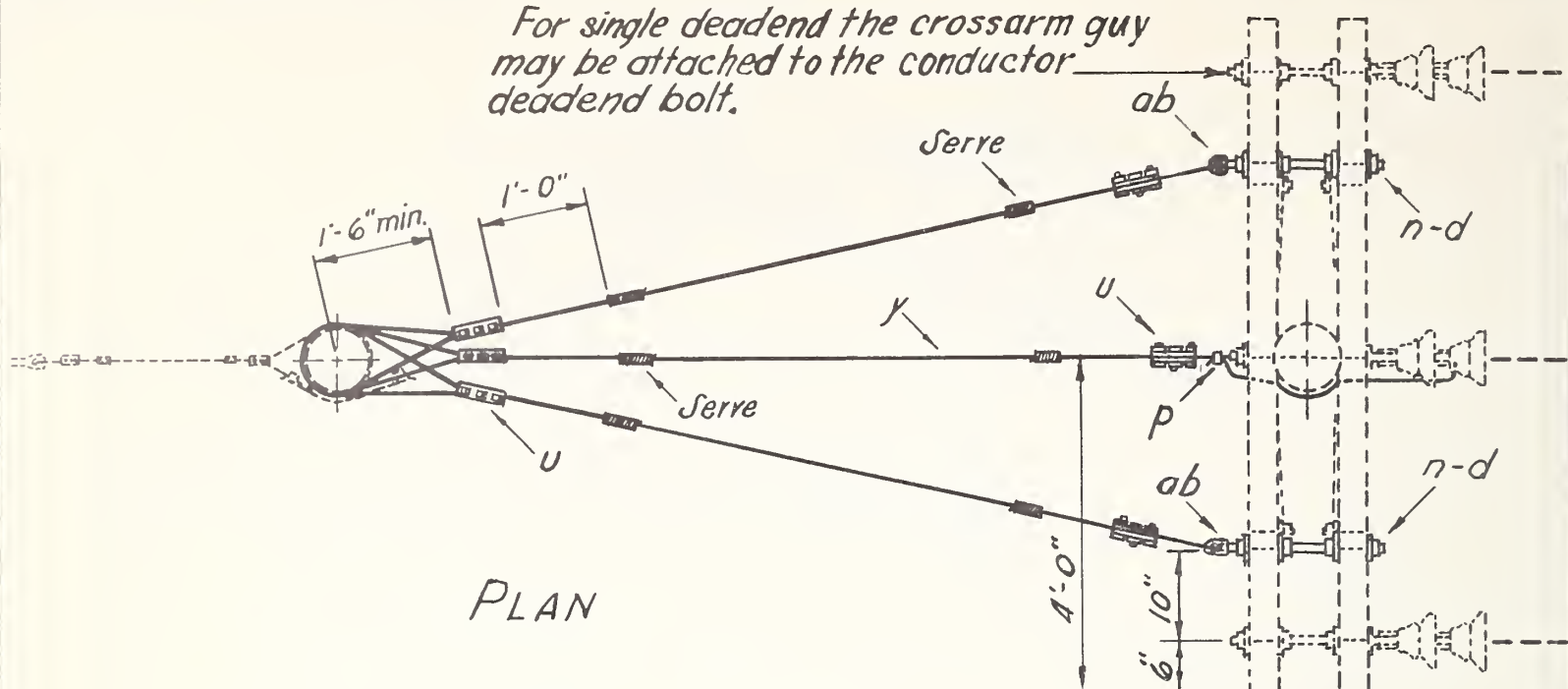
SINGLE OVERHEAD GUY, WRAPPED TYPE

Scale: 1/2" = 1'-0"

Date:

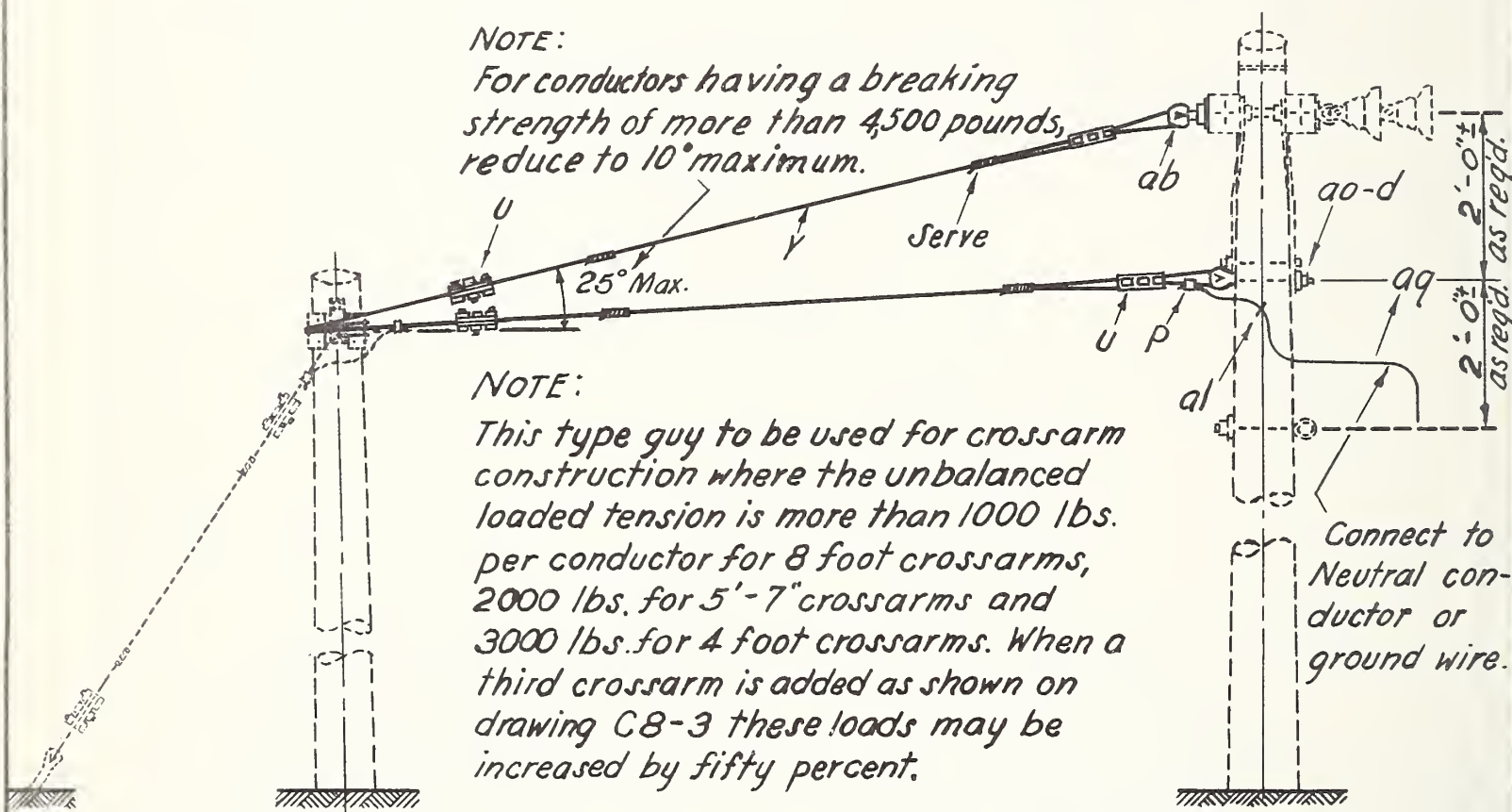
NO.	REVISION	DATE:	E4-2, E4-3
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For single deadend the crossarm guy may be attached to the conductor deadend bolt.



NOTE:

For conductors having a breaking strength of more than 4,500 pounds, reduce to 10° maximum.



ITEM	No. REQD	MATERIAL	ITEM	No. REQD	MATERIAL
d	9	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	ab	2	Nut, thimble type eye, 5/8"
n	2	Bolt, double arming, 5/8" x reqd. lg.	ao	1	Bolt, thimble type eye, 5/8" x reqd. length
p		Connectors, as reqd.	aq		Jumper, #6 S.D. or equivalent
u	6	Clamp, guy, 3 bolt, 6" lg., medium duty	al	1	Staple, ground wire
y		Wire, guy, S.M. 7-strand, as reqd.			

DEADEND GUY CROSSARM CONSTRUCTION

Scale: N.T.S.

Date: Mar. 10, '48

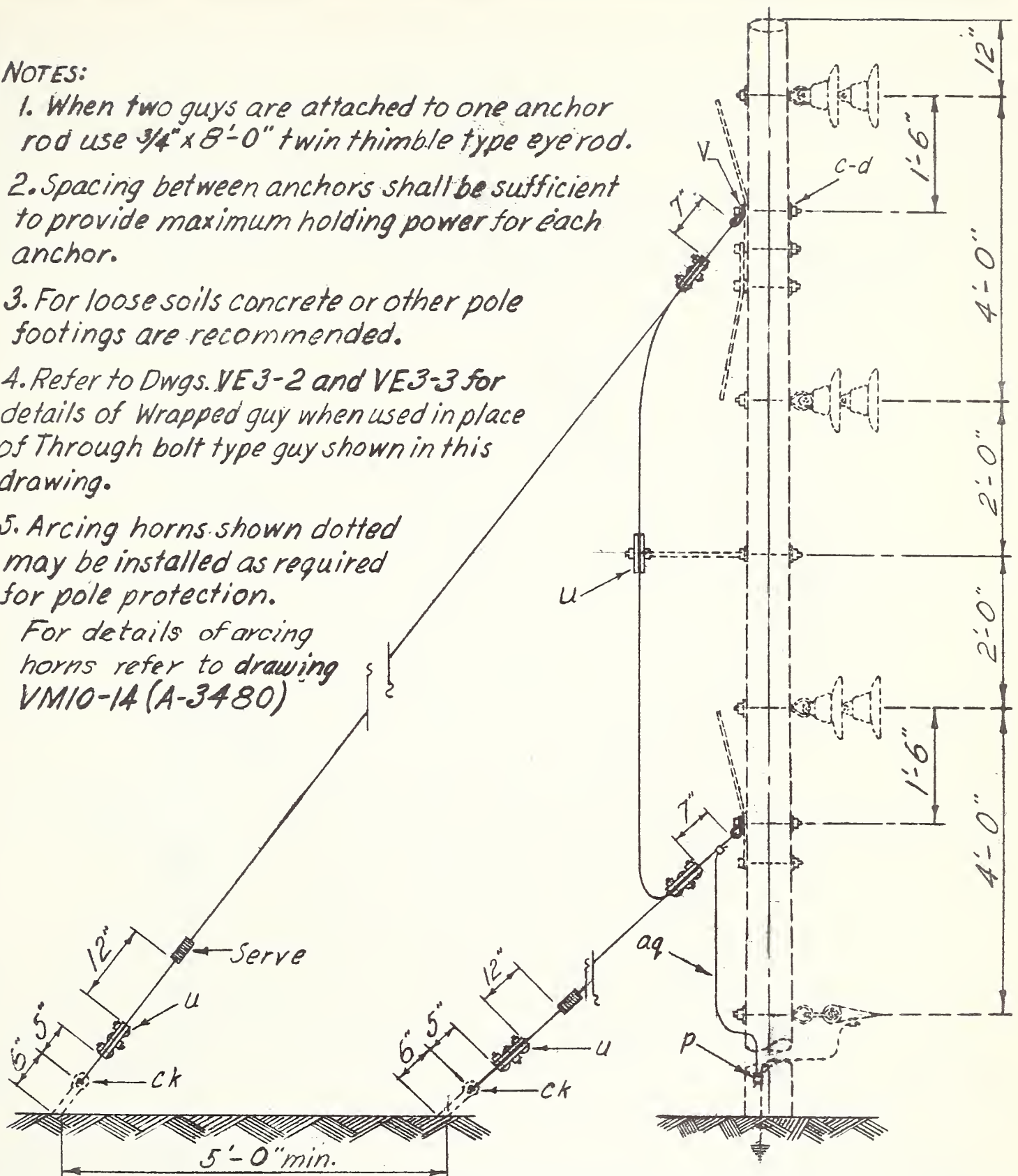
1	Redrawn	3/10/48
No.	REVISIONS	DATE

E5-1R

NOTES:

1. When two guys are attached to one anchor rod use $\frac{3}{4}$ " x 8'-0" twin thimble type eye rod.
2. Spacing between anchors shall be sufficient to provide maximum holding power for each anchor.
3. For loose soils concrete or other pole footings are recommended.
4. Refer to Dwgs. VE3-2 and VE3-3 for details of Wrapped guy when used in place of Through bolt type guy shown in this drawing.
5. Arcing horns shown dotted may be installed as required for pole protection.

For details of arcing horns refer to drawing VM10-14 (A-3480)



ITEM	NO. REQD	MATERIAL	ITEM	NO. REQD	MATERIAL
c	2	Bolt, machine, $\frac{5}{8}$ " x req'd. length	y		Guy wire, S-M., 7-strand
d	2	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{16}$ " hole	ck		Clamp, guy bond, as required
u	5	Clamp, guy, 3 bolt, 6" long	p		Connectors, as req'd.
v	2	Guy attachment	aq		Jumpers or leads, as req'd.

PROPOSED DOUBLE DOWN GUY
14.4/24.9 KV.

Scale: $\frac{1}{2}$ " = 1'-0"

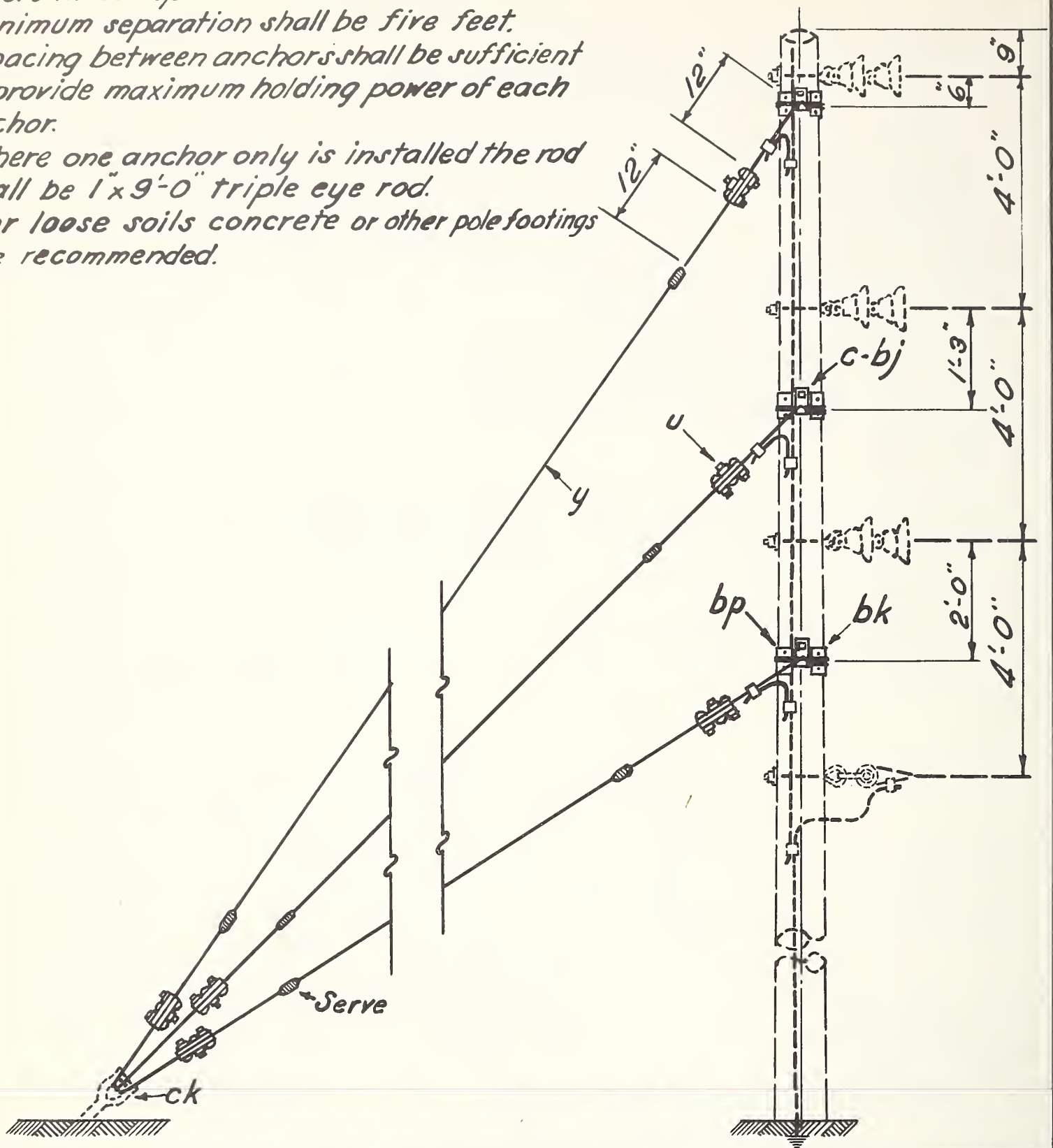
Date: Mar. 20, 1951

1	Minor changes	3-23-51
	REVISION	

VE 6R

Notes

1. Where three separate anchors are installed the minimum separation shall be five feet.
2. Spacing between anchors shall be sufficient to provide maximum holding power of each anchor.
3. Where one anchor only is installed the rod shall be 1" x 9'-0" triple eye rod.
4. For loose soils concrete or other pole footings are recommended.



ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
c	3	Bolt, machine, 5/8" x req'd lg.	bp		Nail, 8 penny, as req'd.
u	6	Clamp, guy, heavy, 3 bolt, 6" lg.	ck		Clamp, guy bond, as req'd.
y		Guy Wire, S-M, 7-strand, as req'd.			
bj	6	Guy Hook, "J"			
bk	6	Guy Plate, 4" x 8", 14 gauge			

THREE DOWN GUYS (LARGE CONDUCTORS)

Scale: 1/2" = 1'-0"

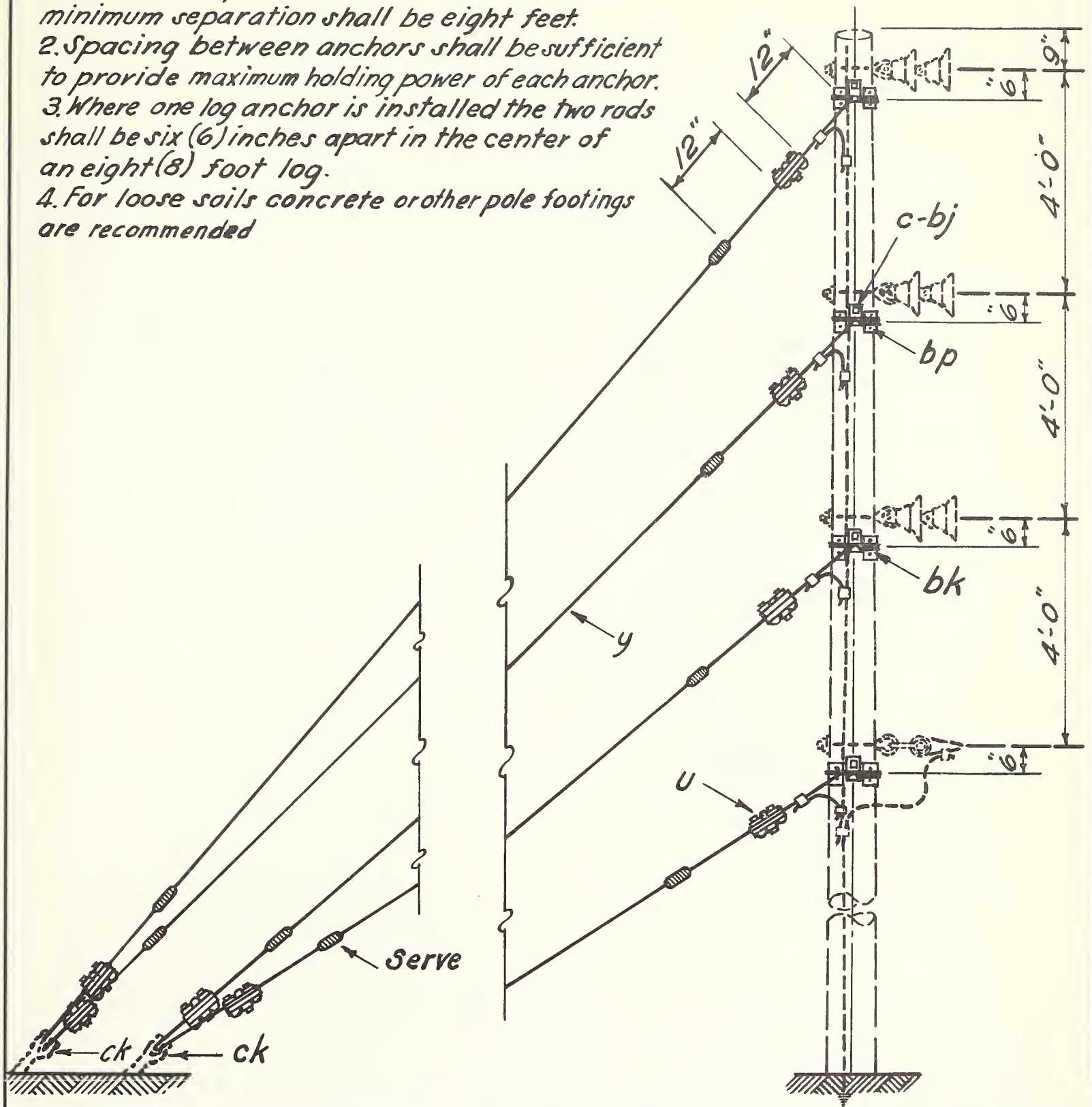
Date: Nov. 20, 47

No. REVISION DATE

E 7

NOTES

1. Where two separate anchors are installed the minimum separation shall be eight feet.
2. Spacing between anchors shall be sufficient to provide maximum holding power of each anchor.
3. Where one log anchor is installed the two rods shall be six (6) inches apart in the center of an eight (8) foot log.
4. For loose soils concrete or other pole footings are recommended



ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
c	4	Bolt, machine, 5/8" x req'd. lg.	bp		Nail, 8 penny, as req'd.
u	8	Clamp, guy, heavy, 3 bolt, 6" lg.	ck		Clamp, guy bond, as req'd.
y		Guy Wire, S-M, 7 strand			
bj	8	Guy Hook "J"			
bk	8	Guy Plate, 4" x 8", 14 gauge			

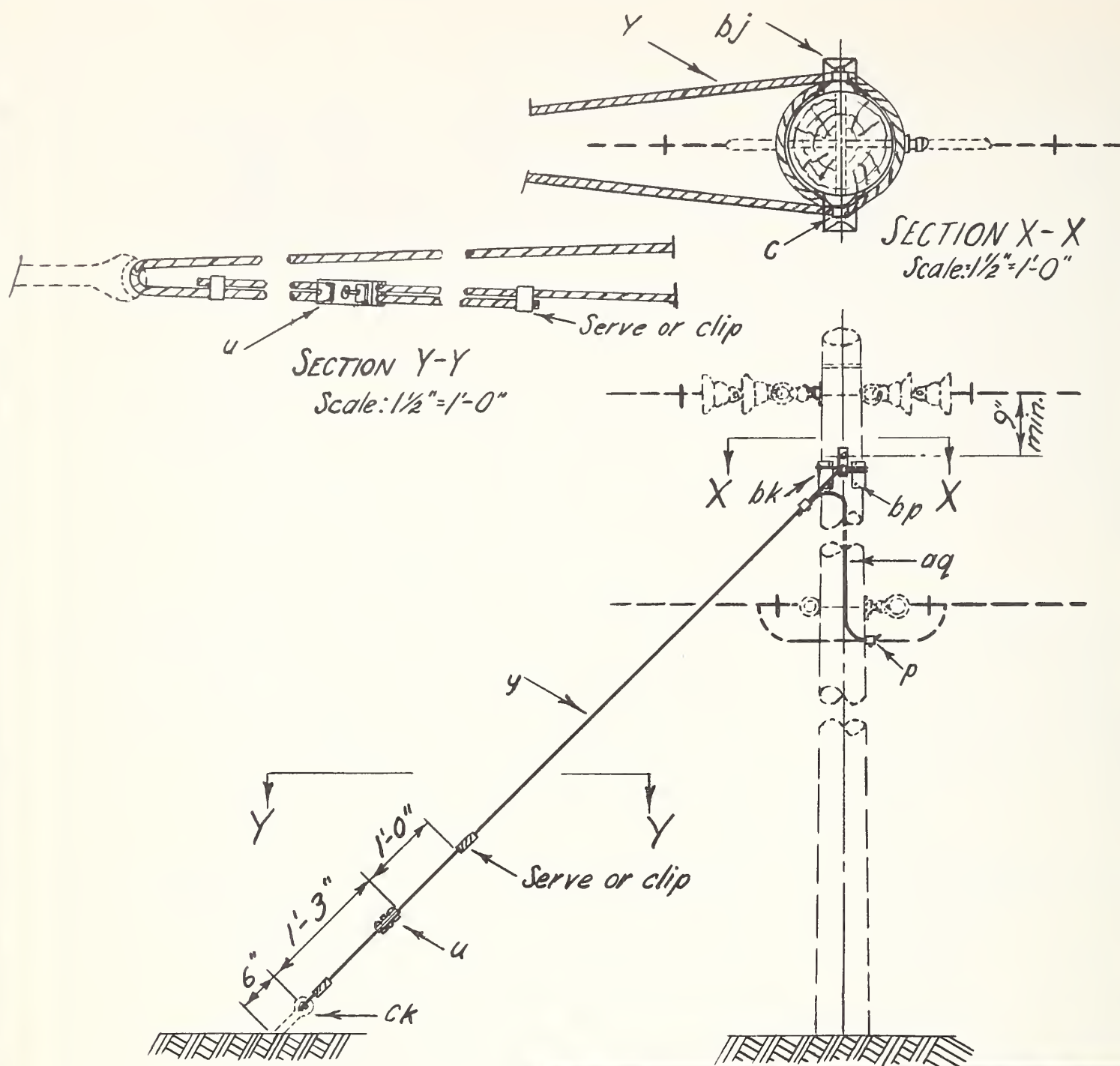
FOUR DOWN GUYS
(LARGE CONDUCTORS)

Scale: 1/2" = 1'-0"

Date: Feb. 9, 1947

E 8

No.	REVISION	DATE
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ASSEMBLY UNIT

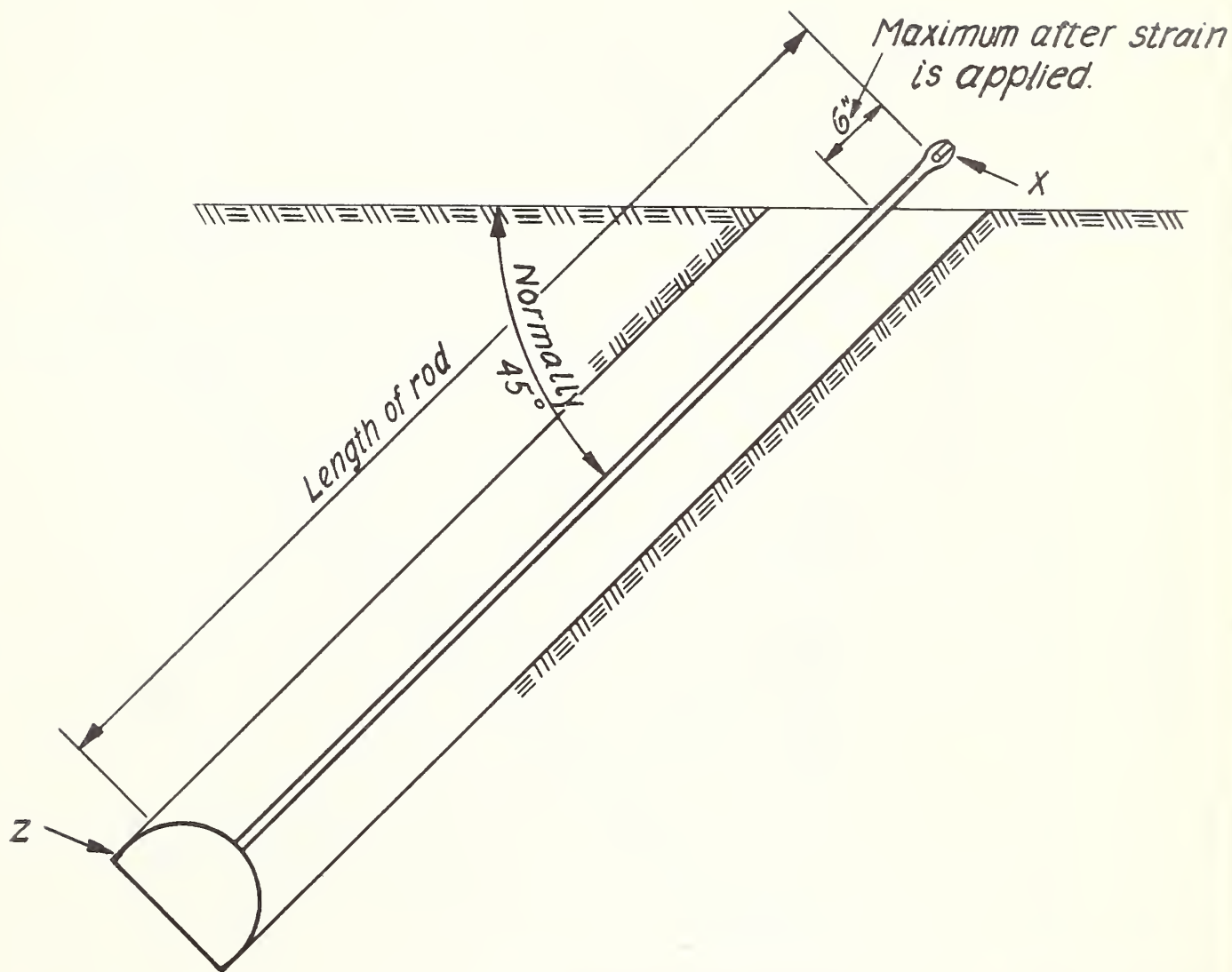
ITEM	MATERIAL	E 11 1/4" GUY WIRE	E 12 3/8" GUY WIRE		
		No. REQ'D	No. REQ'D		
c	Bolt, machine, 5/8" x req'd. length	1	1		
u	Clamp, Guy, 3-bolt, 6" long	1-Medium Duty	1-Medium Duty		
y	Guy Wire, S-M	req'd. length	req'd. length		
ck	Clamp, anchor rod bonding	1	1		
bj	Guy Hook, J	2	2		
bk	Guy Plate, 4" x 8", 14 guage	2	2		
bp	Nail, 8 penny	8	8		
aq	Jumper, #6 S.D. copper or equivalent				
p	Connectors, as req'd.				

SINGLE LOOP GUY, WRAPPED TYPE

Scale: 1/2" = 1'-0"

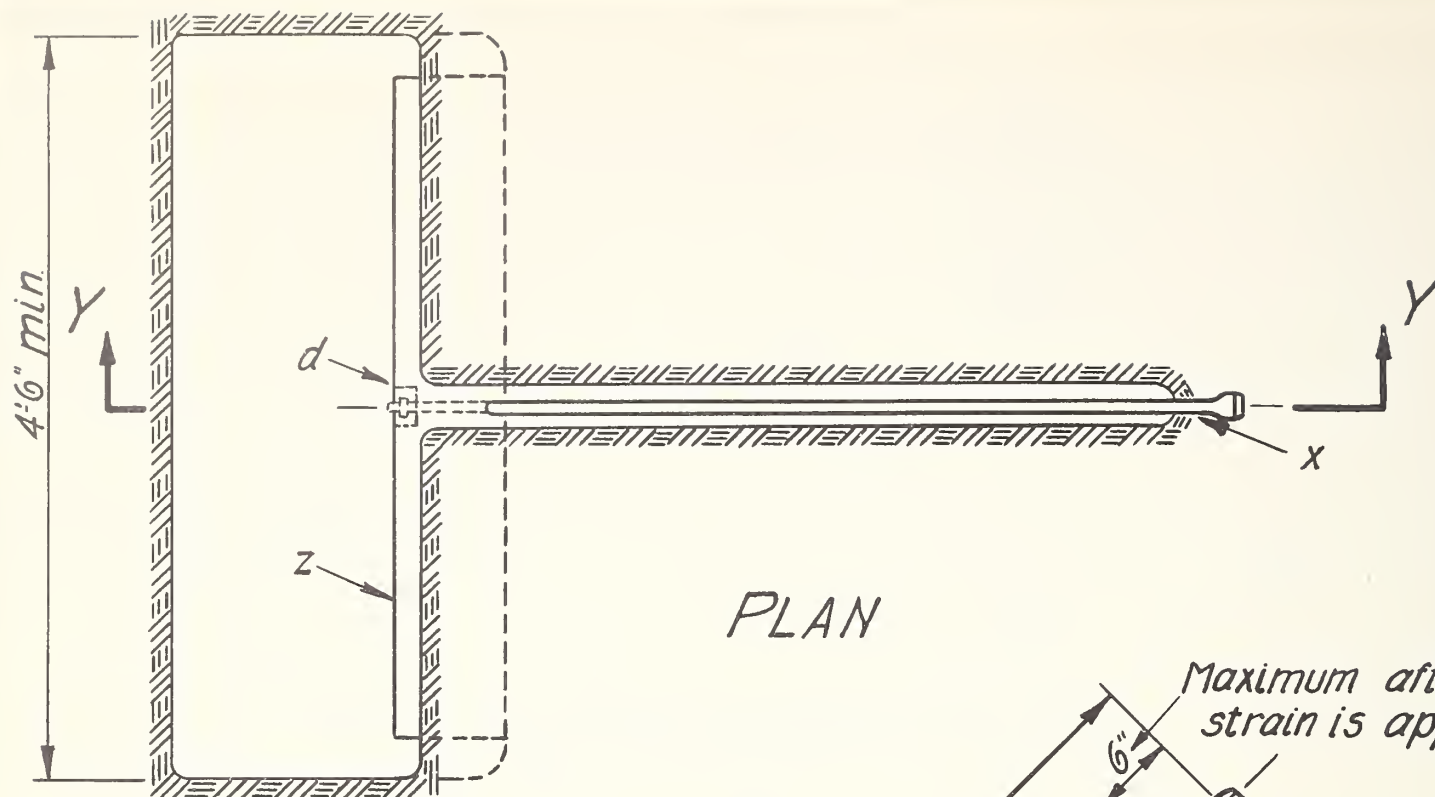
Date: Dec. 20, 1948

E 11, E 12

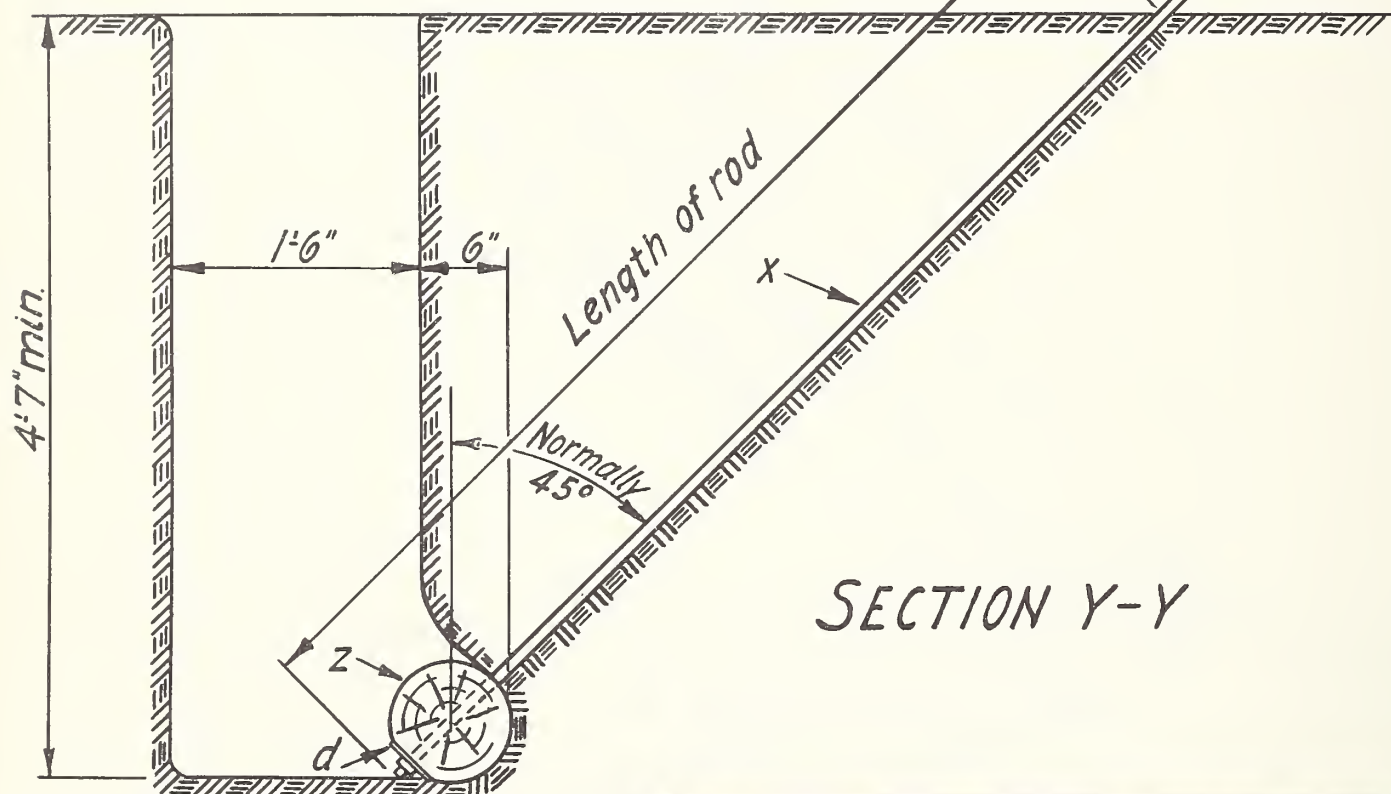


		ASSEMBLY UNIT							
		F1-1		F1-2		F1-3		F1-4	
ITEM	MATERIAL	No. REQ'D	TYPE	No. REQ'D	TYPE	No. REQ'D	TYPE	No. REQ'D	TYPE
X	Rod, anchor, thimble type eye	1	5/8" 7'-0"	1	5/8" 7'-0"	1	3/4" 8'-0"	1	3/4" 8'-0"
Z	Anchor, Patent (holding power in ordinary sail)	1	6000*	1	8000*	1	10,000*	1	12,000*

NO. REVISION		<h3 style="margin: 0;">PATENT ANCHOR ASSEMBLY</h3>	
DATE:		Scale: 3/4" = 1'-0"	
DATE:		Date:	
DATE:		F1-1, F1-2, F1-3, F1-4.	



PLAN



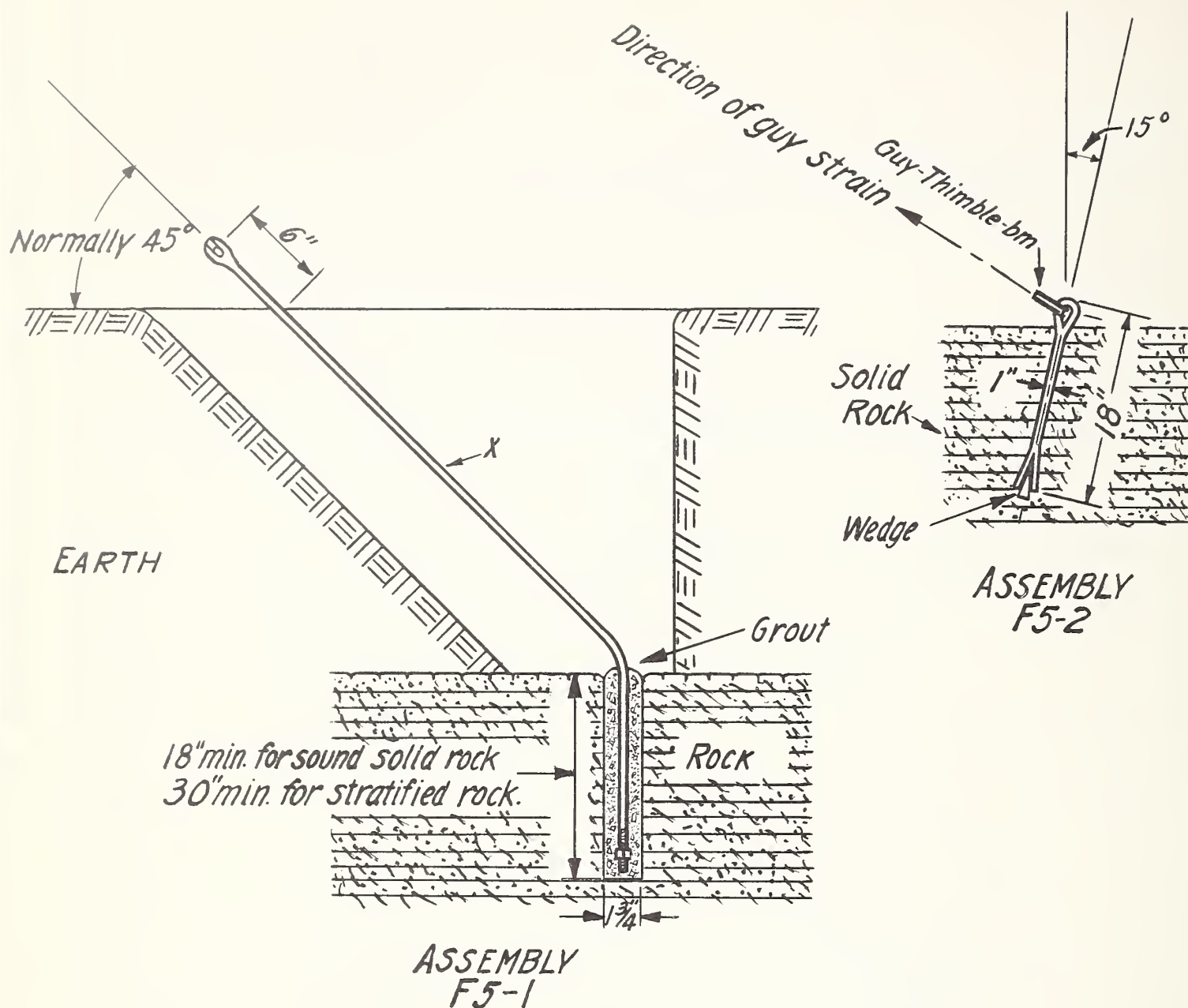
SECTION Y-Y

ASSEMBLY UNIT

ITEM	MATERIAL	ASSEMBLY UNIT							
		F2-1		F2-2		F2-3		F2-4	
		No. REQ'D.	TYPE	No. REQ'D.	TYPE	No. REQ'D.	TYPE	No. REQ'D.	TYPE
d	Washer, $1\frac{3}{16}$ " hole (1 $\frac{1}{8}$ " min. for F2-4)	1	4" x 4" x $\frac{1}{2}$ "	1	4" x 4" x $\frac{1}{2}$ "	1	4" x 4" x $\frac{1}{2}$ "	1	4" x 4" x $\frac{1}{2}$ "
x	Rod, anchor, thimble type eye	1	$\frac{5}{8}$ " x 7'-0"	1	$\frac{3}{4}$ " x 8'-0"	1	$\frac{3}{4}$ " x 8'-0"	1	1" x 9'-0"
z	Anchor (creosoted log)	1	8" dia. x 4'-0"	1	9" dia. x 4'-6"	1	10" dia. x 5'-0"	1	12" dia. x 5'-0"
	Holding power in ordinary soil		8000*		10 000*		12 000*		16,000*

LOG ANCHOR ASSEMBLY

1	Added F2-4 Unit	8-12-40	Scale: $\frac{3}{4}$ " = 1'-0"	Date:
NO.	REVISION	DATE:		F2-1, F2-2, F2-3, F2-4



Notes:

- 1.- Only one guy shall be attached to a rock anchor. Where more than one guy is required space anchors 2 ft. minimum and where practical they shall be in direct line with pole.
- 2.- Do not anchor to any boulder measuring less than 5 ft. in two directions at right angles to each other.

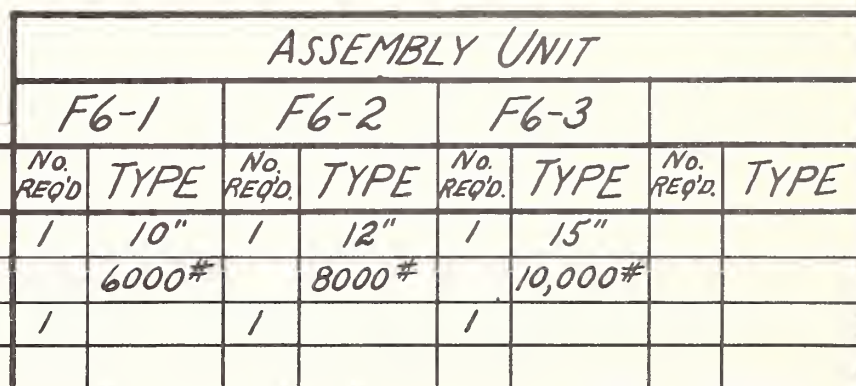
ROCK ANCHOR ASSEMBLY

Scale: 3/4"=1'-0"

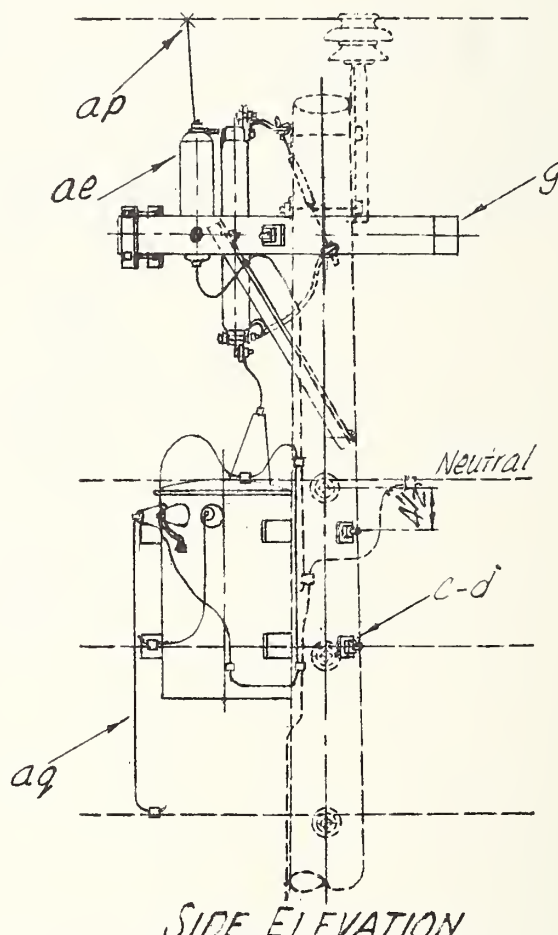
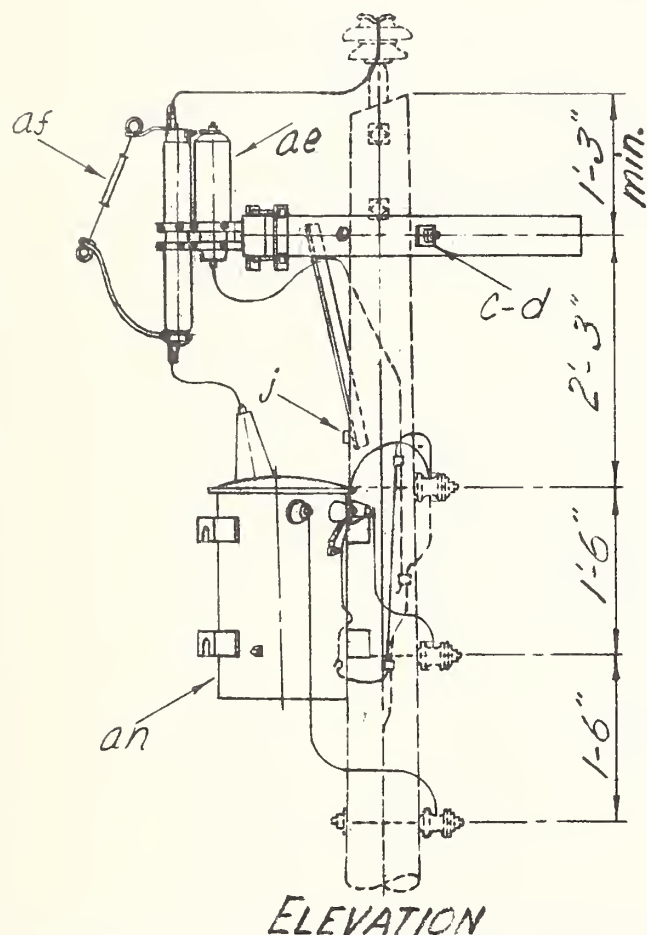
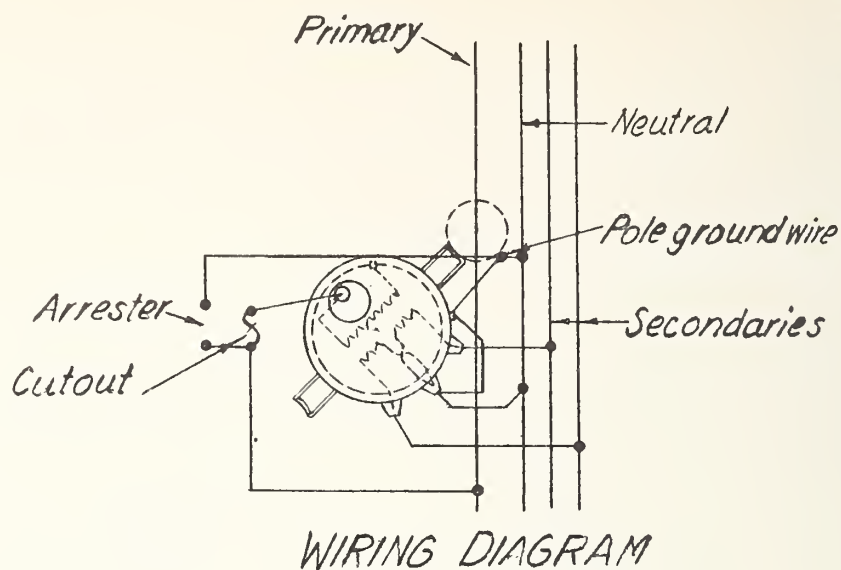
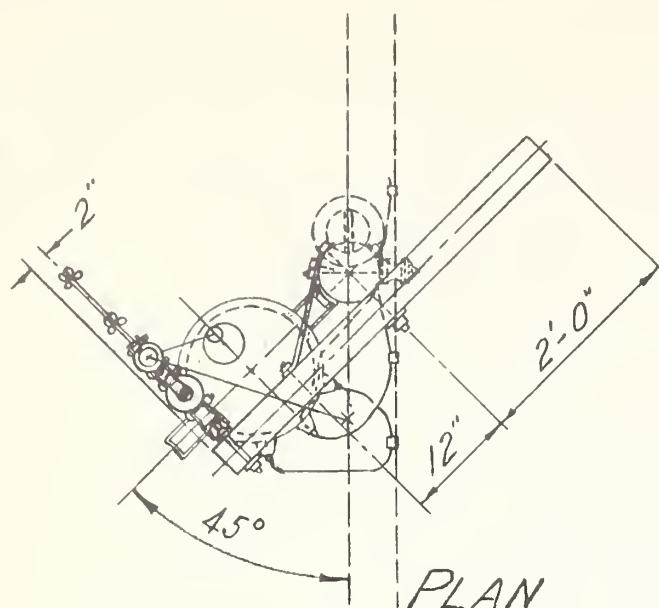
Date:

F5-1, F5-2

NO. REVISION DATE



No.	REVISION	DATE
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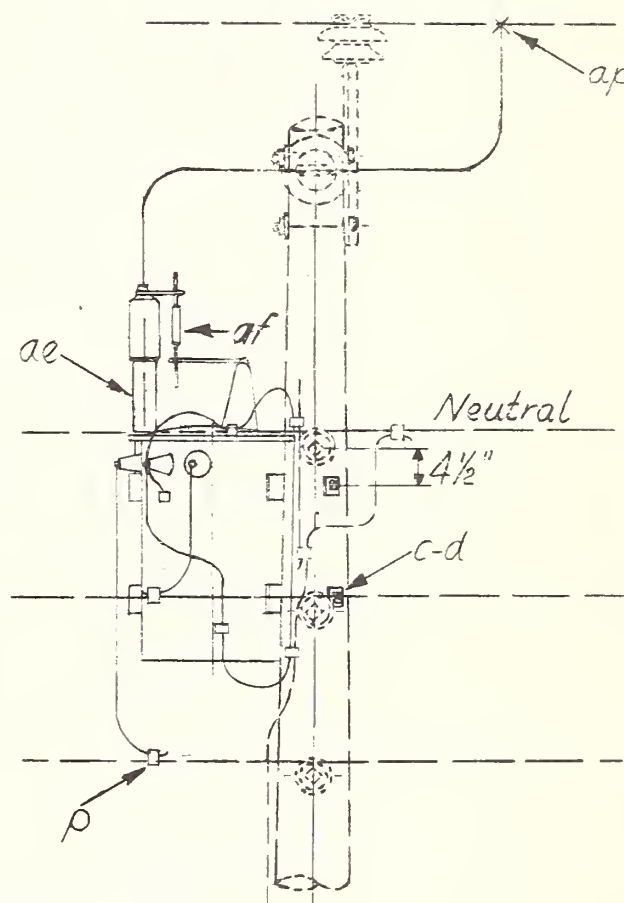
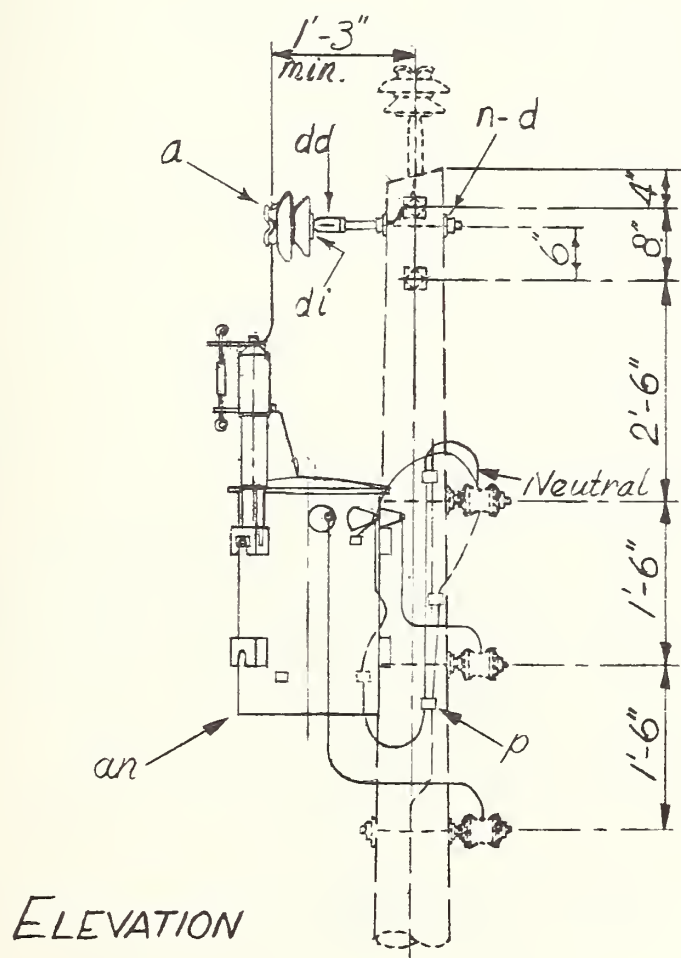
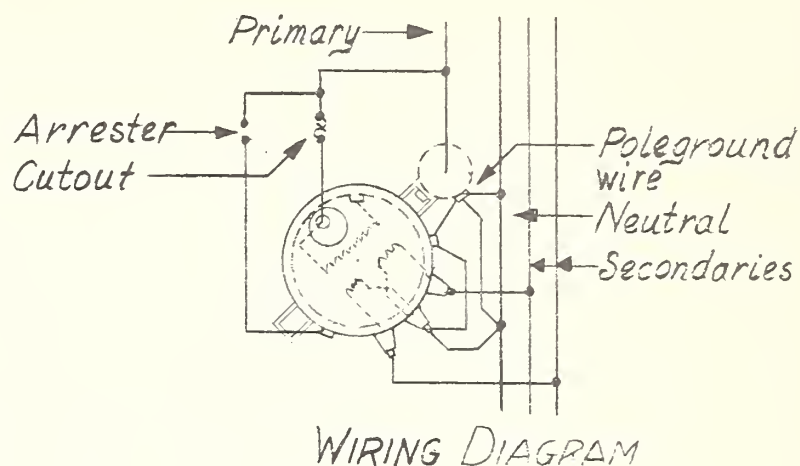
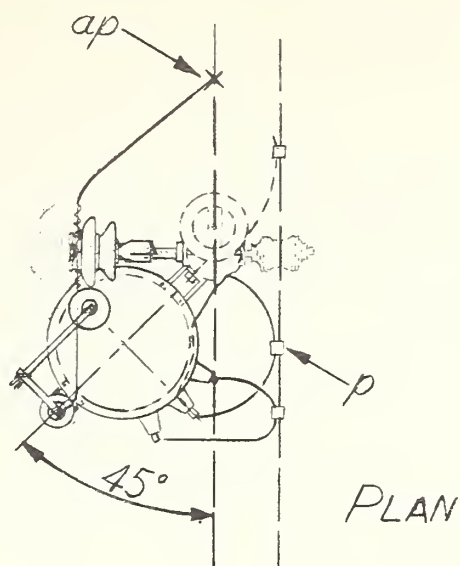
ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
c	3	Bolt, machine, 5/8"x reg'd. length	ae	1	Lightning arrester
d	4	Washer, 2 1/4"x 2 1/4"x 3/16", 3/16" hole	af	1	Cutout, fuse, single shot
g	1	Crossarm, 3 1/2"x 4 1/2"x 4'-0"	an	1	Transformer, Coordinated, Convent.
h	1	Brace, flat, 1 1/4"x 1/4"x 28"	ap	1	Clamp, hot line, tap assembly
i	1	Bolt, carriage, 3/8"x 4 1/2"	aq		Leads, #6 S.D. copper or equiv.
j	1	Screw, lag, 1/2"x 4"			
p		Connectors, as required			

14.4/24.9KV. PRIMARY, 1-PHASE 2-WIRE NEUTRAL GROUND
CONVENTIONAL TRANSFORMER AT 0° TO 5° ANGLE

Scale: 1/2"=1'-0"

Date: May 5, 1950

NO.	REVISION	Date:	VG 5-1 1/2
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ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
a	1	Insulator, pin type	an	1	Transformer, coordinated, conventional
c	2	Bolt, machine, $\frac{5}{8}$ " x req'd. length	ap	1	Clamp, hot line, tap assembly
d	4	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{16}$ " hole	aq		Leads, #6 S.D. copper or equiv.
n	1	Bolt, double arming $\frac{5}{8}$ " x req'd. lgth.	dd	1	Adapter, Insulator
ae	1	Lightning arrester	di	1	Adapter, thimble $1\frac{3}{8}$ " to 1"
af	1	Cutout, fuse, single shot	p		Connectors, as req'd.

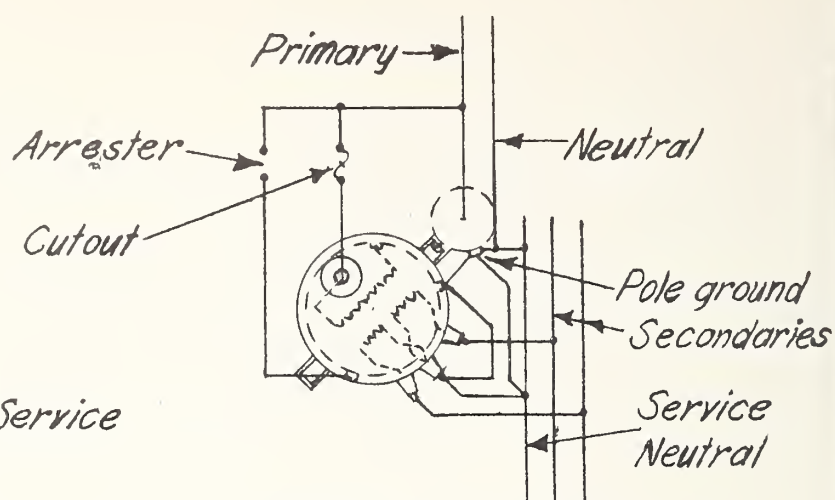
14.4/24.9 KV. PRIMARY, 1-PHASE 2-WIRE, NEUTRAL GROUNDED
CONVENTIONAL TRANSFORMER WITH TANK
MOUNTED CUTOUT AND LIGHTNING ARRESTER

Scale: $\frac{1}{2}$ " = 1'-0"

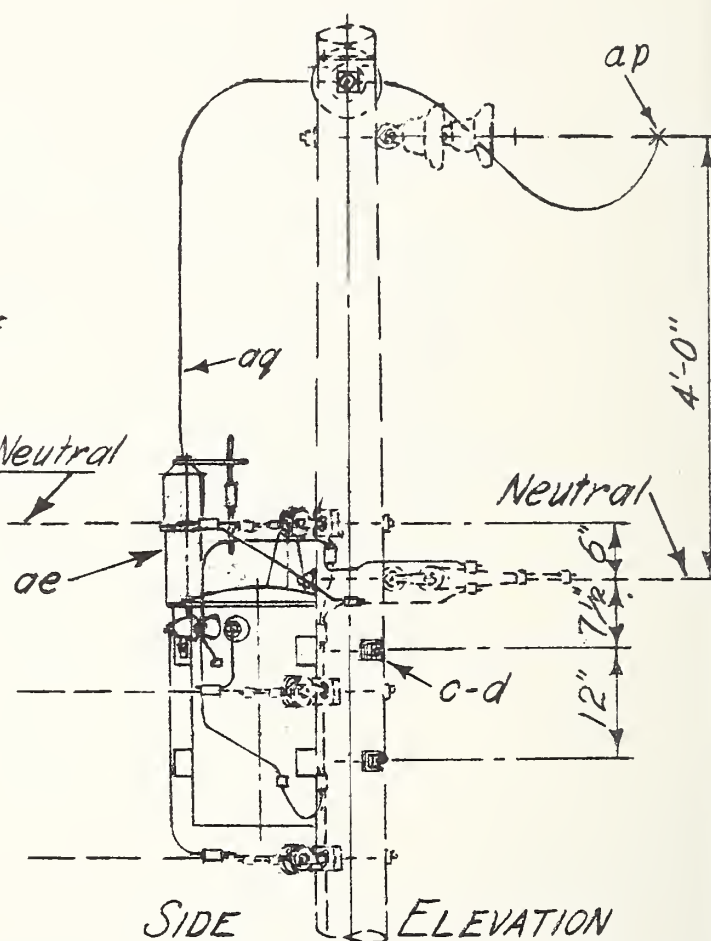
Date: June 9, '49

VG 9-1 1/2

No. REVISION DATE:



WIRING DIAGRAM

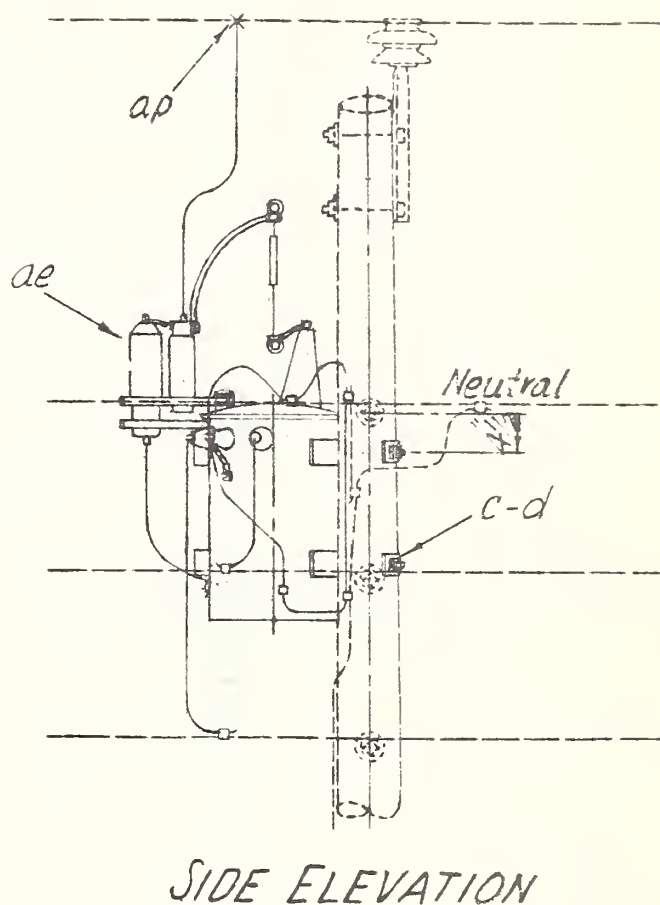
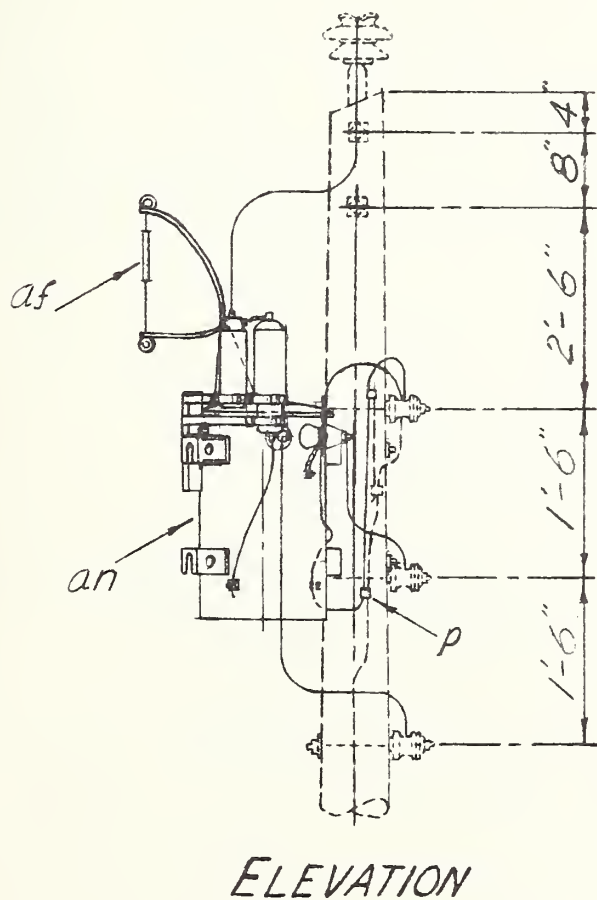
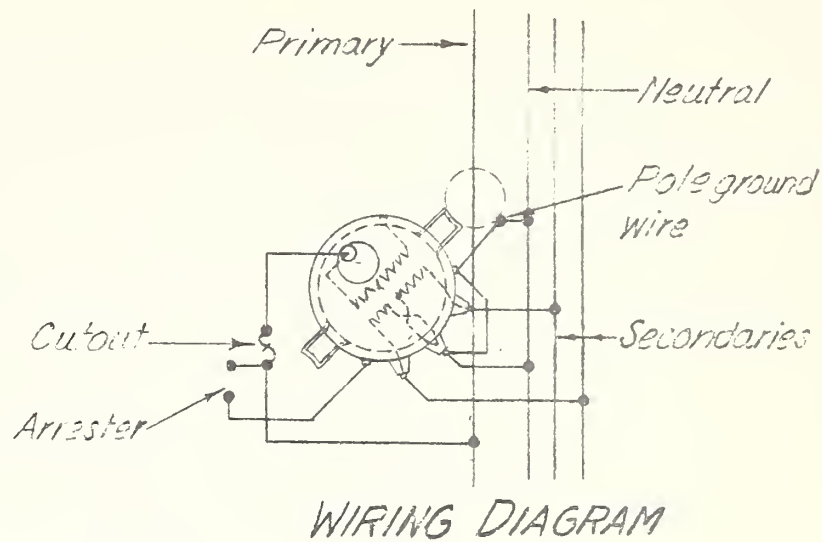
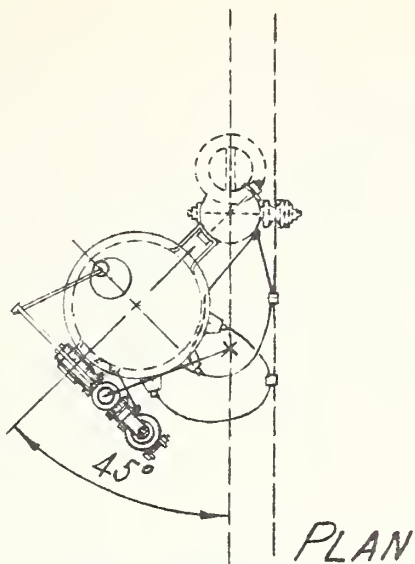


14.4/24.9KV. PRIMARY, 1-PHASE, 2-WIRE, NEUTRAL GROUNDED
CONVENTIONAL TRANSFORMER AT DEADEND WITH
TANK MOUNTED CUTOUT AND LIGHTNING ARRESTER

Date: July 19, 1949

VG10-1 1/2

No.	REVISION	DATE
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ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
c	2	Bolt, machine, $\frac{5}{8}$ " x reqd. length	an	1	Transformer, coordinated, convert.
d	2	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{16}$ " hole	ap	1	Clamp, hot line, tap assembly
p		Connectors, as required	aq		Leads, #6 S.D. copper or equiv.
ae	1	Lightning arrester			
af	1	Cutout, fuse, single shot			

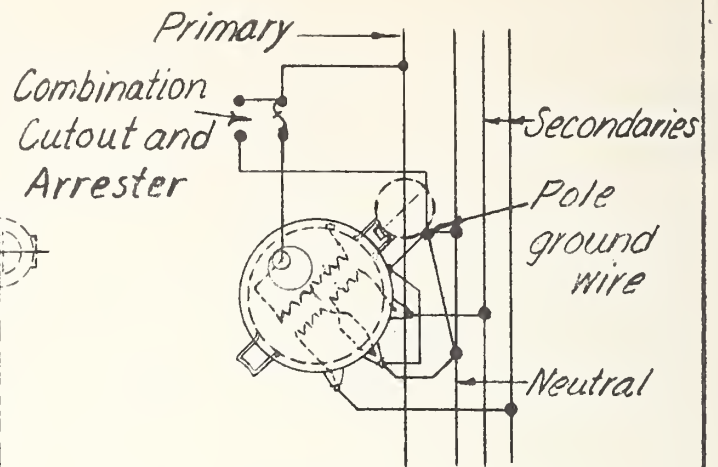
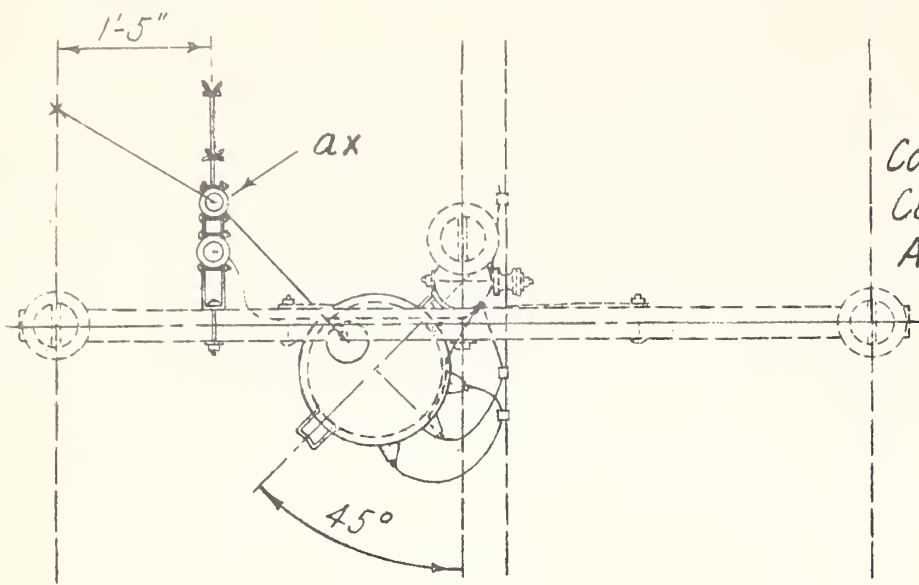
14. 4/24. 9KV. PRIMARY, 1-PHASE 2-WIRE NEUTRAL GROUNDED
CONVENTIONAL TRANSFORMER AT 0° TO 5° ANGLE

Scale: $\frac{1}{2}$ " = 1'-0"

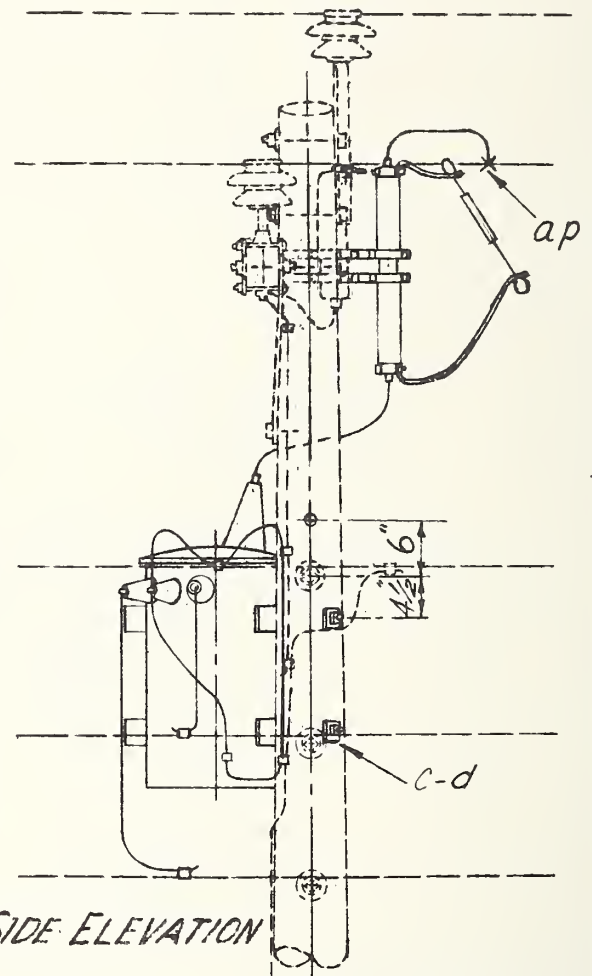
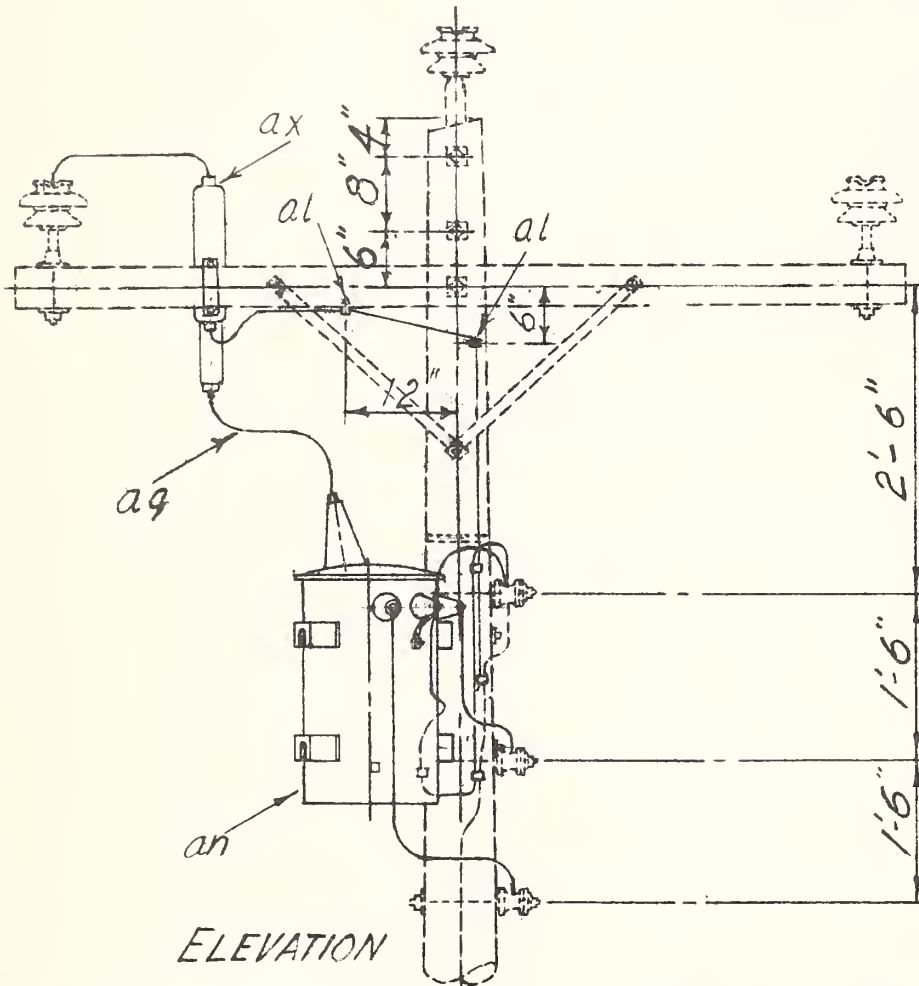
Date: May 10, 1950

NO. REVISION DATE:

VG19-1 1/2



WIRING DIAGRAM



ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
			al	2	Ground wire clip
			an	1	Transformer, coordinated, conventional
c	2	Bolt, machine, 5/8" x req'd. length	ap	1	Clamp, hot line, tap assembly
d	2	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	aq		Leads, #6 S.D. copper or equiv.
p		Connectors, as required	ax	1	Combination Cutout and Arrester

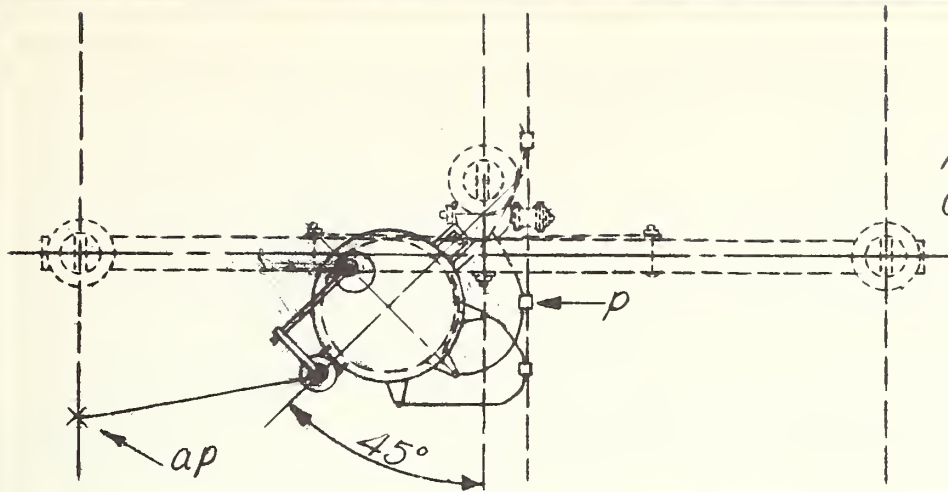
14.4/24.9 KV. PRIMARY, 3-PHASE 4-WIRE STAR
CONVENTIONAL TRANSFORMER ON OUTER WIRE OF 5" ANGLE

Scale: 1/2"=1'-0"

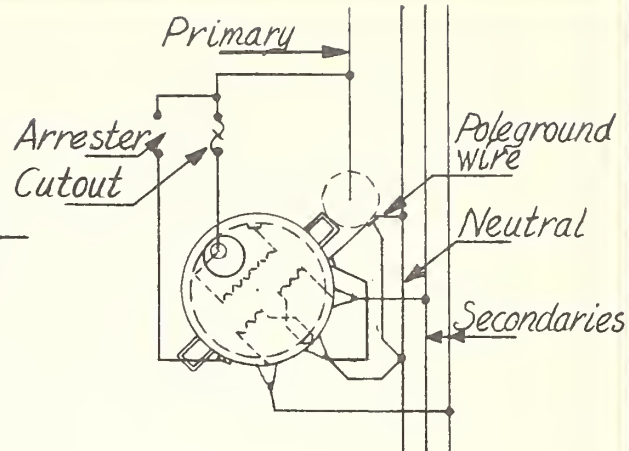
Date: May 16, 1950

1	Removed "jumper bracket"	7-9-50
No.	REVISION	DATE:

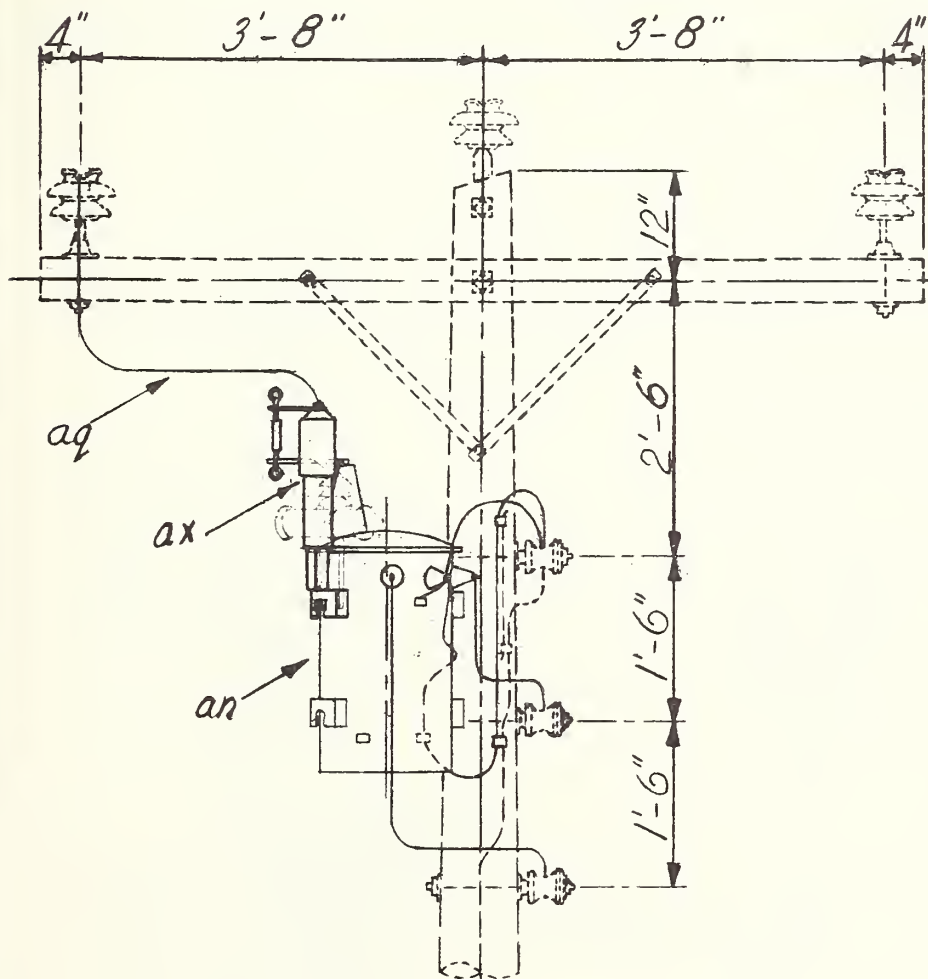
VG 36-1 1/2 R



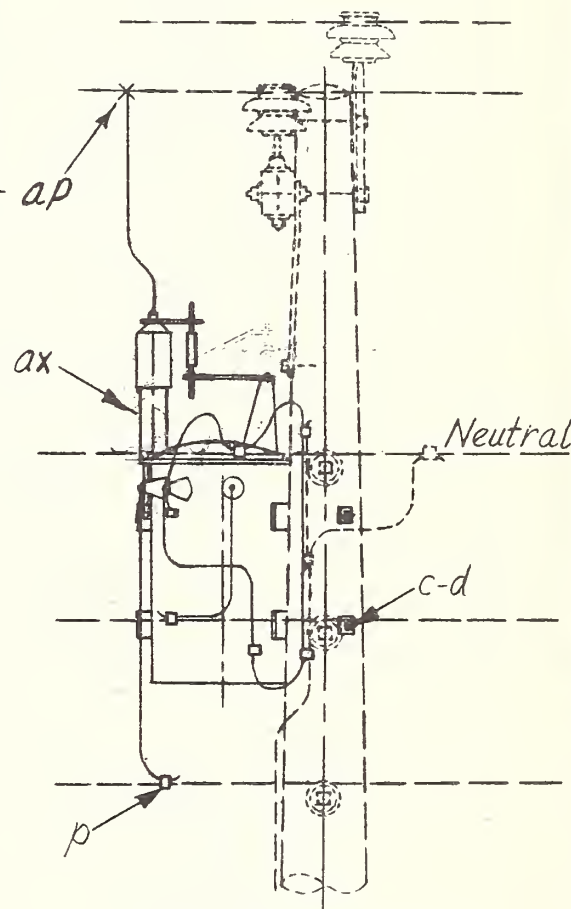
PLAN



WIRING DIAGRAM



ELEVATION

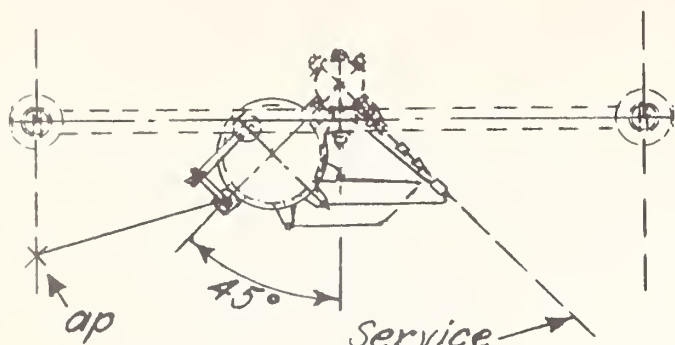


SIDE ELEVATION

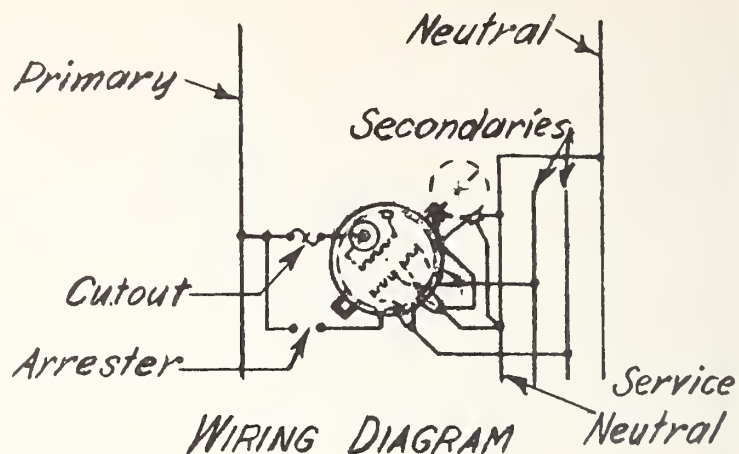
ITEM	No. REQ'd	MATERIAL	ITEM	No. REQ'd	MATERIAL
c	2	Bolt, machine, $\frac{9}{16}$ " x req'd. length	ax	1	Combination cutout and arrester
d	2	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole	an	1	Transformer, conventional
p		Connectors, as required	ap	1	Clamp, hot line, tap assembly
			aq		Leads, #6 S.D. copper or equiv.

14.4/24.9 KV. PRIMARY, 3-PHASE, 4-WIRE STAR
CONVENTIONAL TRANSFORMER WITH TANK
MOUNTED CUTOUT AND LIGHTNING ARRESTER

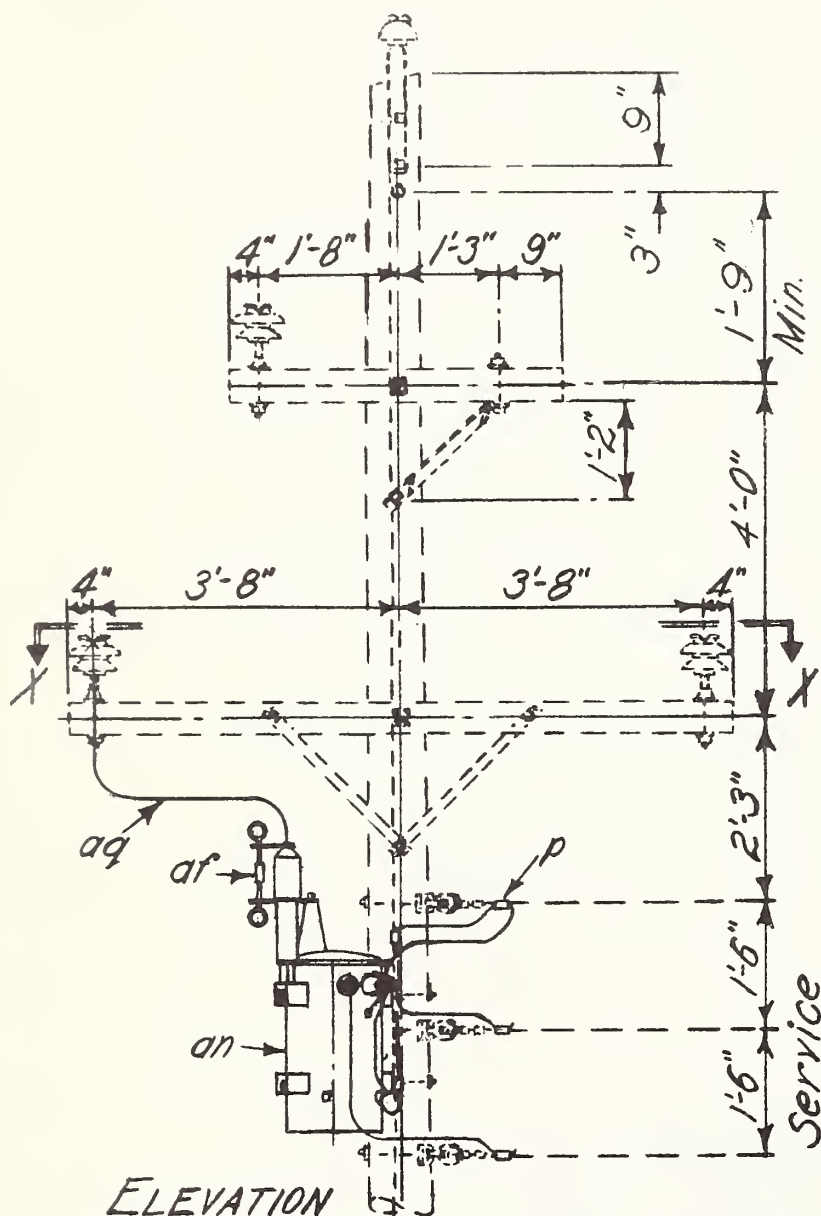
1	Minor changes and additions	3-8-51	Scale: $\frac{1}{2}$ " = 1'-0"	Date: June 24, 49
No.	REVISION	Date:		VG39-1 $\frac{1}{2}$ R



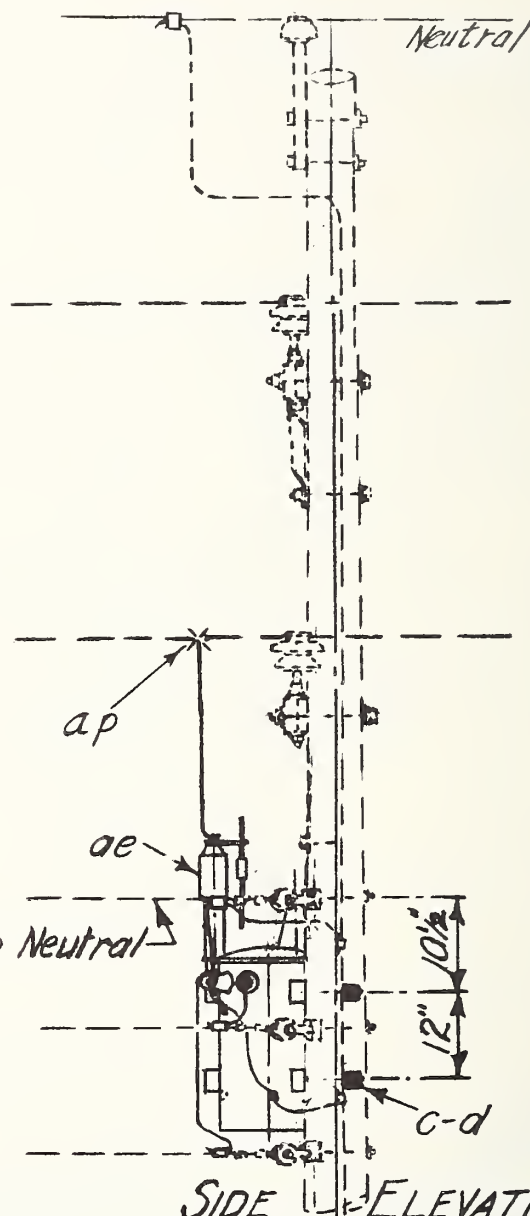
SECTION X-X



WIRING DIAGRAM



ELEVATION



SIDE ELEVATION

ITEM	No. Req'd	MATERIAL	ITEM	No. Req'd	MATERIAL
c	2	Bolt, machine, 5/8" x req'd length	af	1	Cutout, fuse, single shot
d	2	Washer, 2 1/4 x 2 1/4 x 3/16, 1 3/16 hole	an	1	Transformer, conventional
p		Connectors, as req'd.	ap	1	Clamp, hot line, tap assembly
ae	1	Lightning arrester	aq		Leads, #6 S.D. copper or equiv

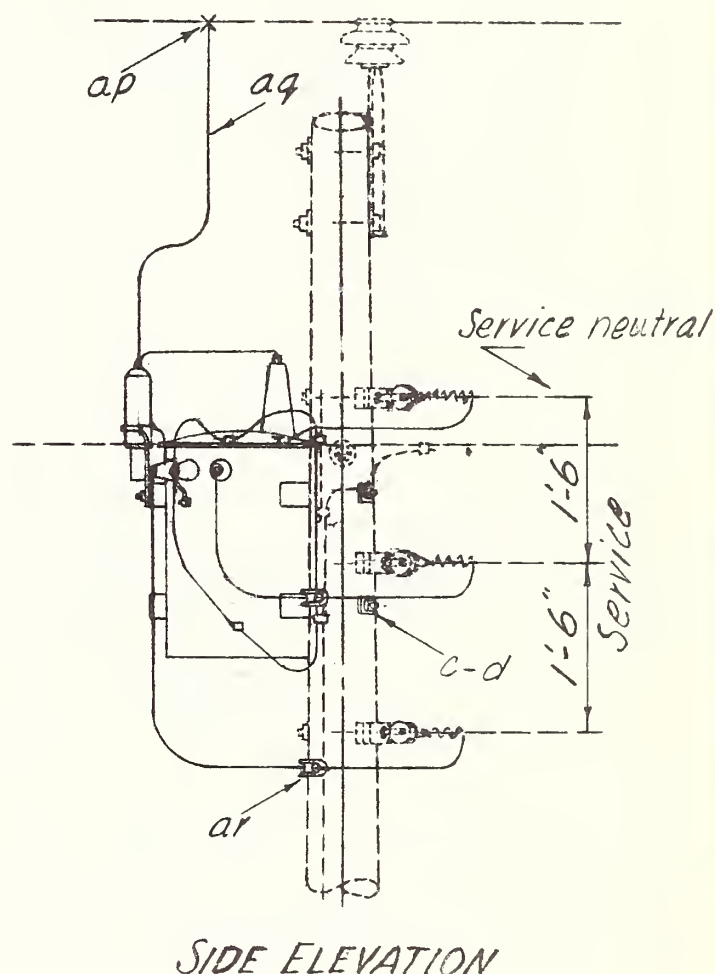
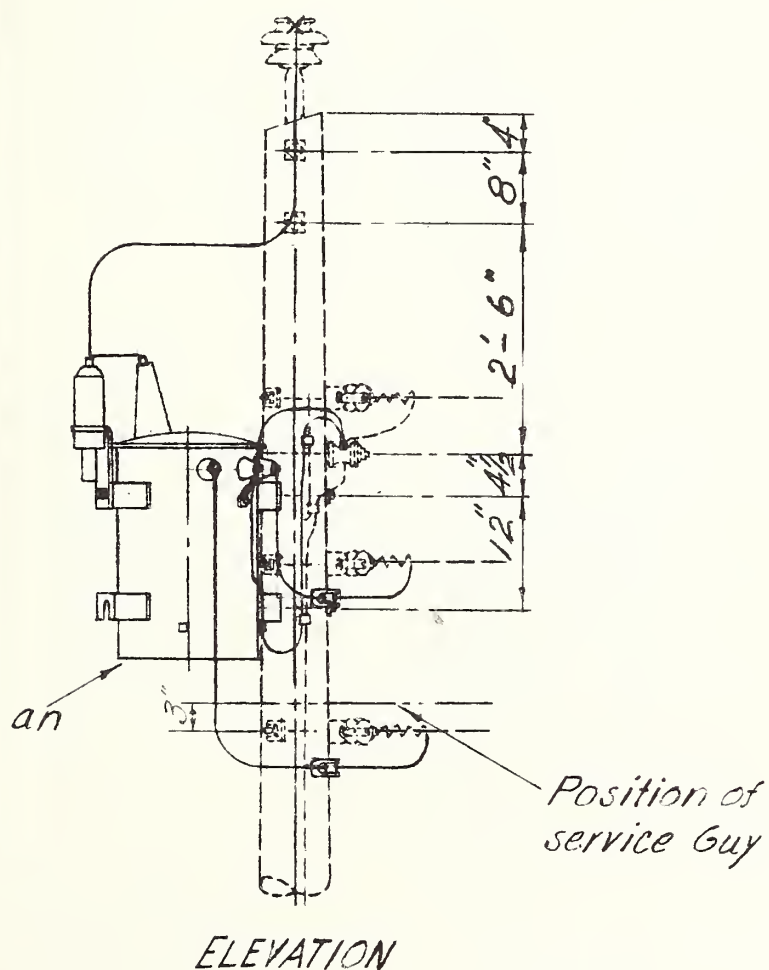
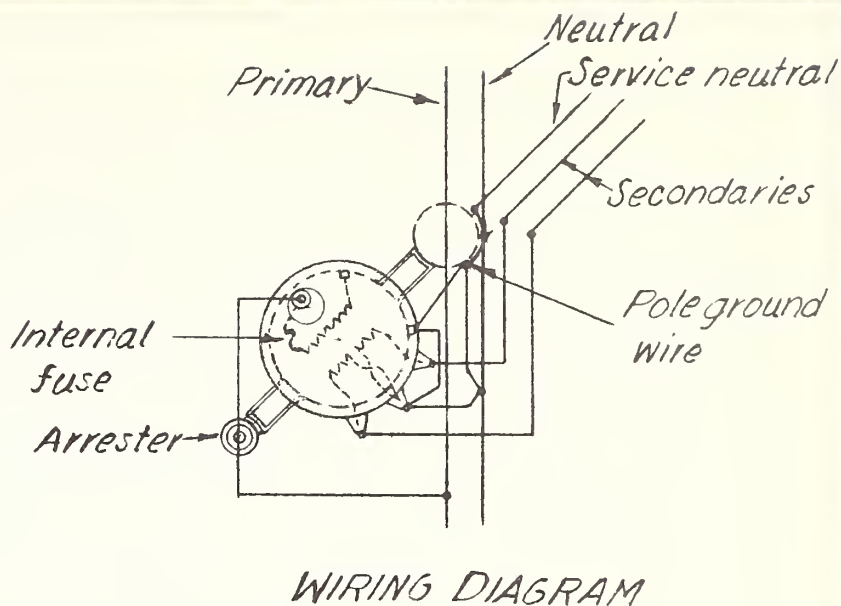
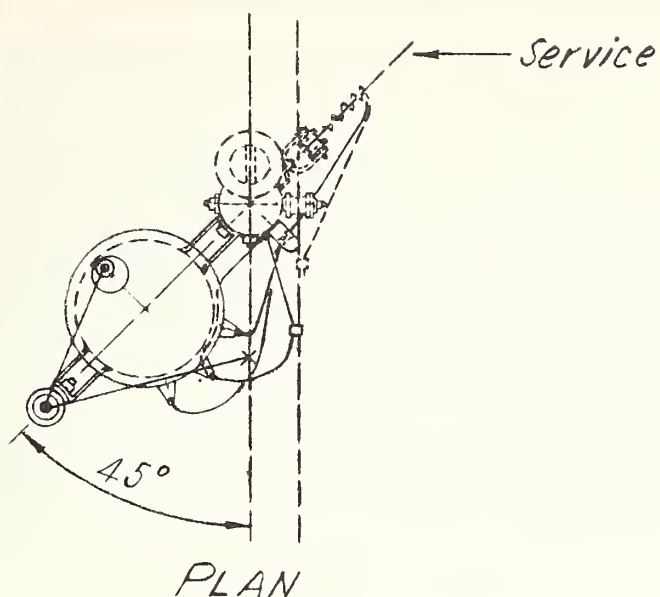
14.4/24.9 KV. PRIMARY, 3-PHASE, 4-WIRE STAR
OVERHEAD NEUTRAL-CONVENTIONAL TRANSFORMER
WITH TANK MOUNTED CUTOUT AND LIGHTNING ARRESTER

Scale: 3/8" = 1'-0"

Date: Oct. 20, '49

No.	REVISION	DATE	No.	REVISION	DATE
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VG 49-1 1/2



ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
c	2	Bolt, machine, 5/8" x reg'd. lgtr.	ap	1	Clamp, hot line, tap assembly
d	2	Washer, 2 1/4" x 2 1/4" x 3/16", 3/16" hole	aq		Leads, #6 S.D. copper or equiv.
p		Connectors, as required	ar	2	Wireholder
an	1	Transformer, self protected type			

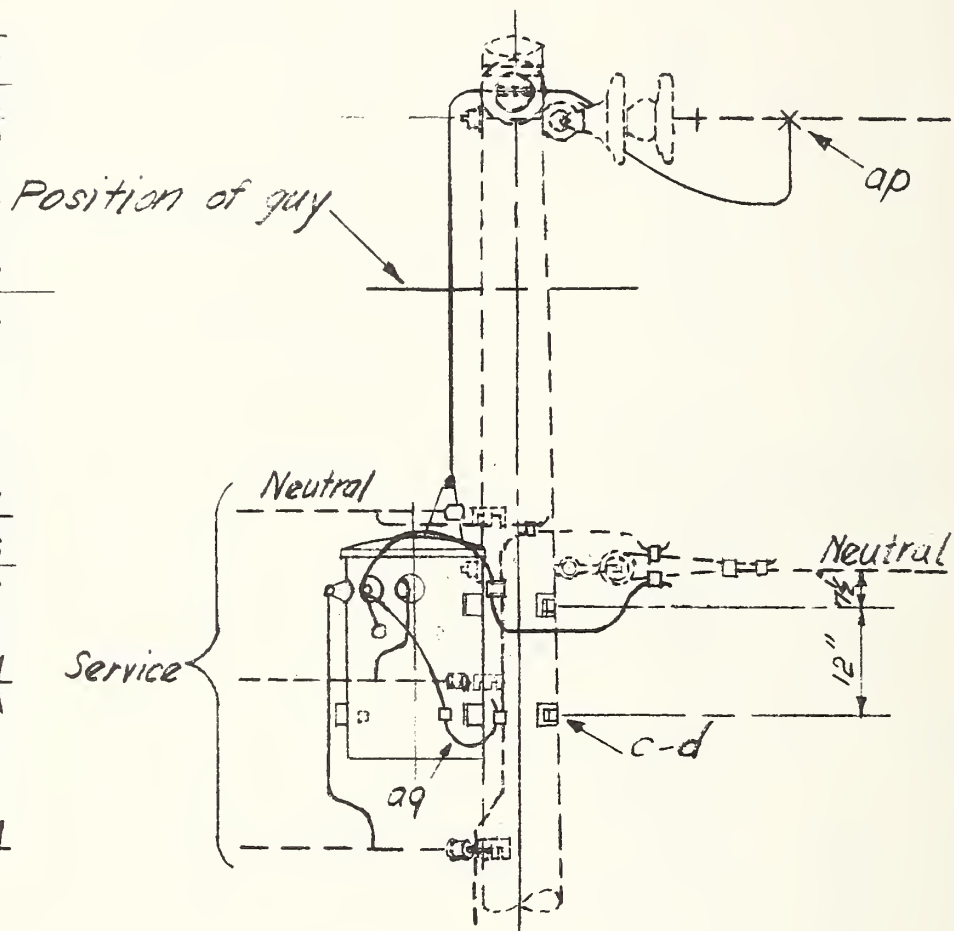
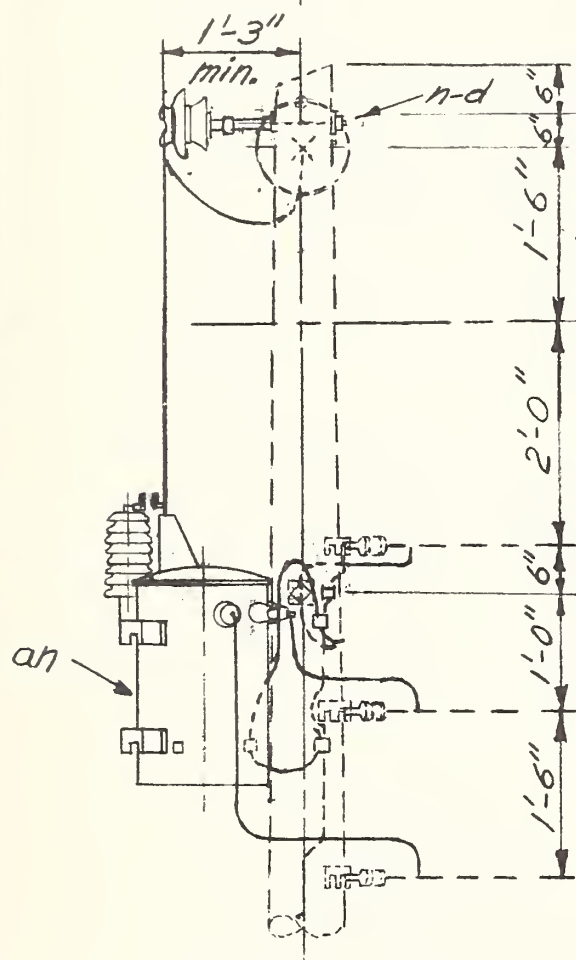
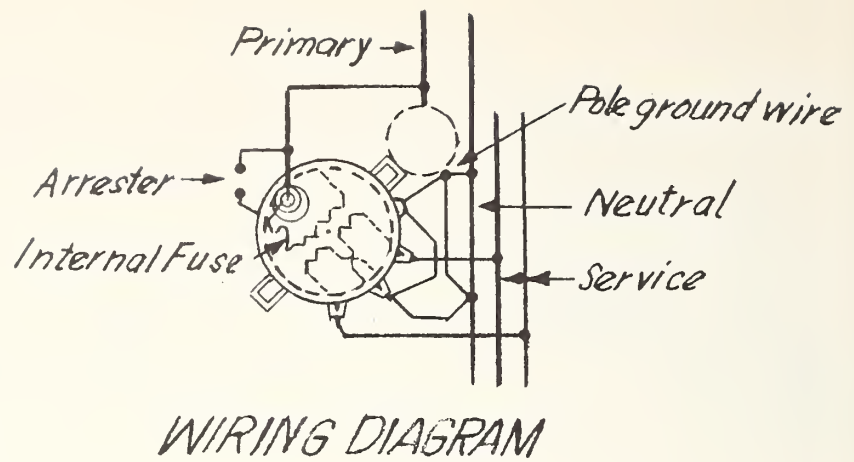
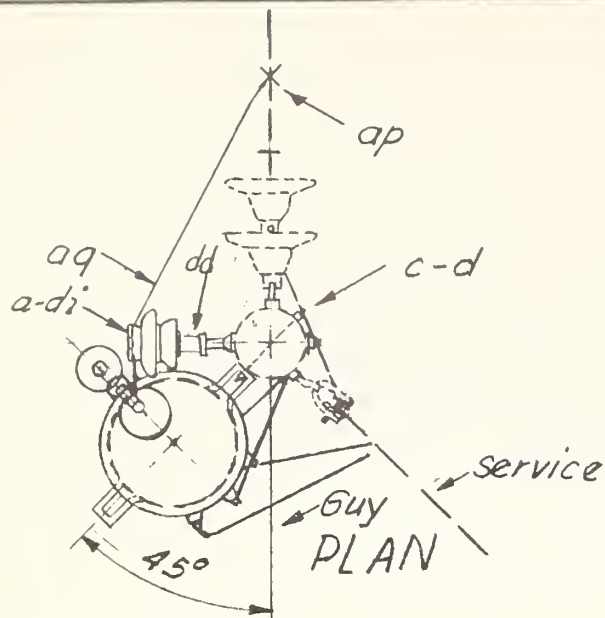
14.4/24.9 KV. PRIMARY, 1-PHASE, 2-WIRE NEUTRAL GROUND
SELF PROTECTED TRANSFORMER AT 0° TO 5° ANGLE

Scale: 1/2"=1'-0"

Date: April 3, 1950

No. REVISION DATE:

VG105-1 1/2A



ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
Q	1	Insulator, pin type	an	1	Transformer, self protected type
C	2	Bolt, machine, 5/8" x req'd. length	ap	1	Clamp, hot line, top assembly
d	4	Washer, 2 1/4" x 2 1/4" x 3/16", 3/16" hole	aq		Leads, #6 S.D. Copper or equiv.
n	1	Bolt, double arming, 5/8" x req'd. length	dd	1	Adapter, insulator 5/8"
p		Connectors, as req'd.	di	1	Adapter, thimble, 1 3/8" to 1"

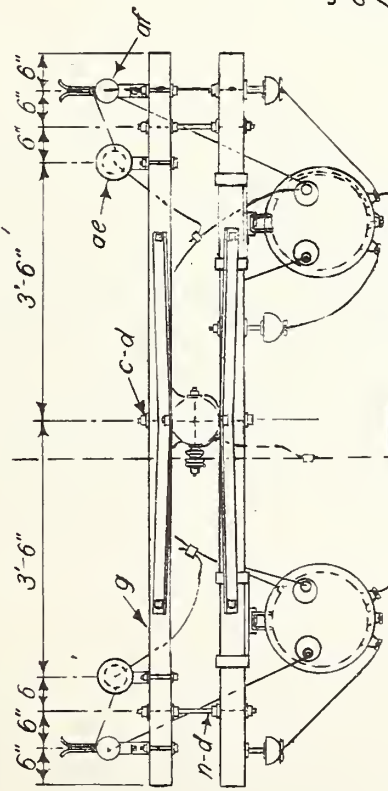
14.4/24.9 KV. PRIMARY, 1-PHASE 2-WIRE, NEUTRAL GROUND
SELF PROTECTED TRANSFORMER AT DEADEND

Scale 1/2" = 1'-0"

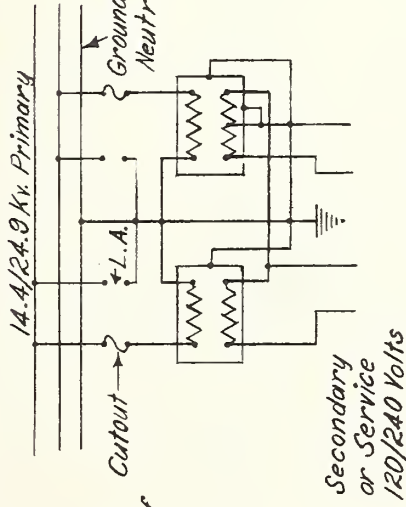
Date: April 26, 1951

No	REVISION	DATE
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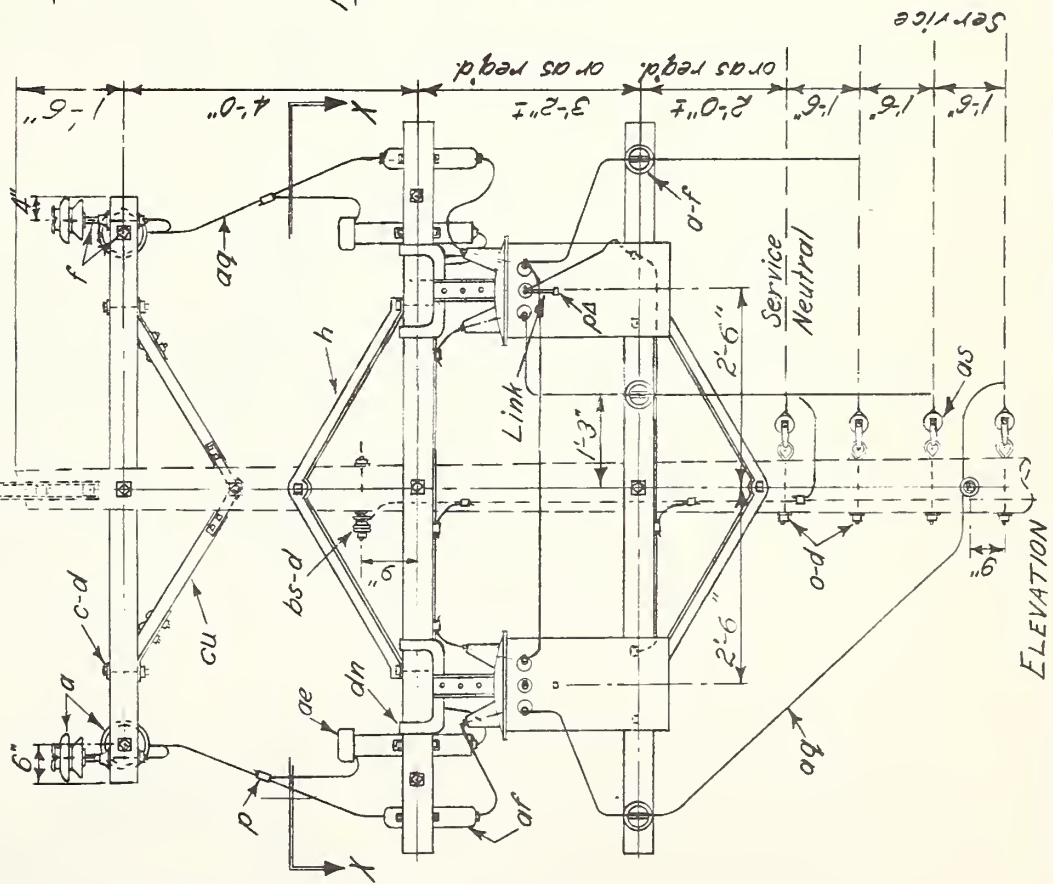
VG106-1 1/2



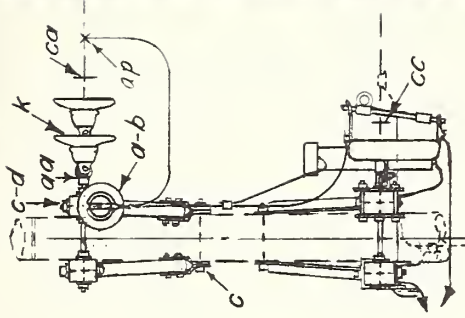
SECTION X-X



WIRING DIAGRAM

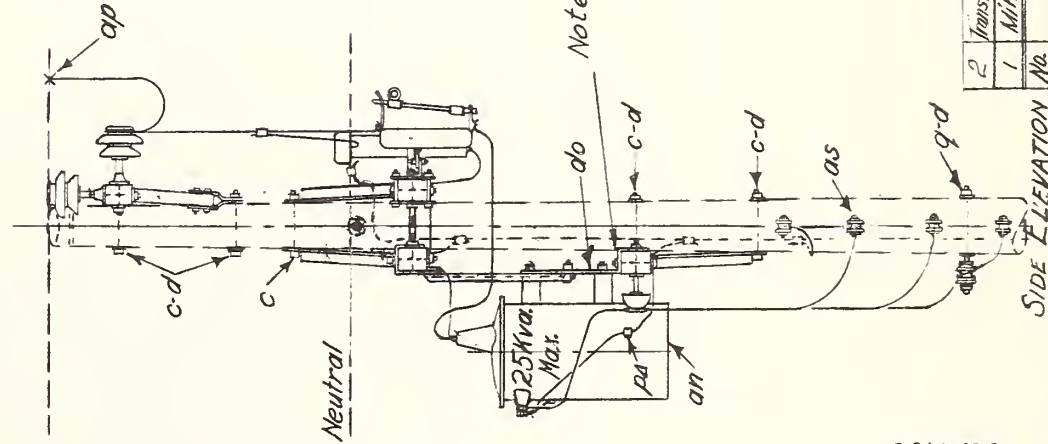


ELEVATION



DEADEND ARRANGEMENT

NOTE:
The two 10 inch suspension insulators shown may be replaced by three 6-inch insulators.



SIDE ELEVATION

Note: Drill for 1/2" bolt.

ITEM	No. Required	MATERIAL
a	4	Insulator, pin type, 23Kv.
a	3	Insulator, pin type, 9Kv.
c	6	Bolt, machine, 3/8" req'd. length
c	8	Bolt, machine, 1/2" req'd. length
d	22	Washer, round, 1 3/8" dia, 3/16" hole
d	6	Washer, round, 1 3/8" dia, 3/16" hole
f	4	Pin, crossarm, steel, 3/8" x 14"
f	3	Pin, crossarm, steel, 3/8" x 10 3/4"
g	1	Crossarm, 3 1/2" x 4 1/2" x 8'-0"
g	3	Crossarm, 3 3/4" x 4 3/4" x 10'-0"
h	3	Brace, angle, 1 1/2" x 1 1/2" x 9'6", 60° span
n	2	Bolt, double-arming, 5/8" req'd. length
p	1	Connectors, as req'd.
q	1	Bolt double upset, insulated
ae	2	Lightning arrester
af	2	Cutout, fuse, single shot
an	2	Transformer
ap	2	Clamp, hot line, tap assembly
aq	4	Leads, #6 S.D. copper or equiv.
as	4	Clevis, service, swinging, insulated
bs	1	Bolt, single upset, insulated
dh	2	Hanger, T-crossarm, as req'd.
db	2	Kicker bracket
pa	3	Connector, solderless
cu	1	Link, neutral grounding
cu	1	Brace, wood, 60" inch span
o	4	Bolt eye, 5/8" x 12 3/4", length

* Specify these items to be furnished by the manufacturer.

NOTE: All tanks to be grounded.
Secondary neutral shall be disconnected from one tank and not grounded.

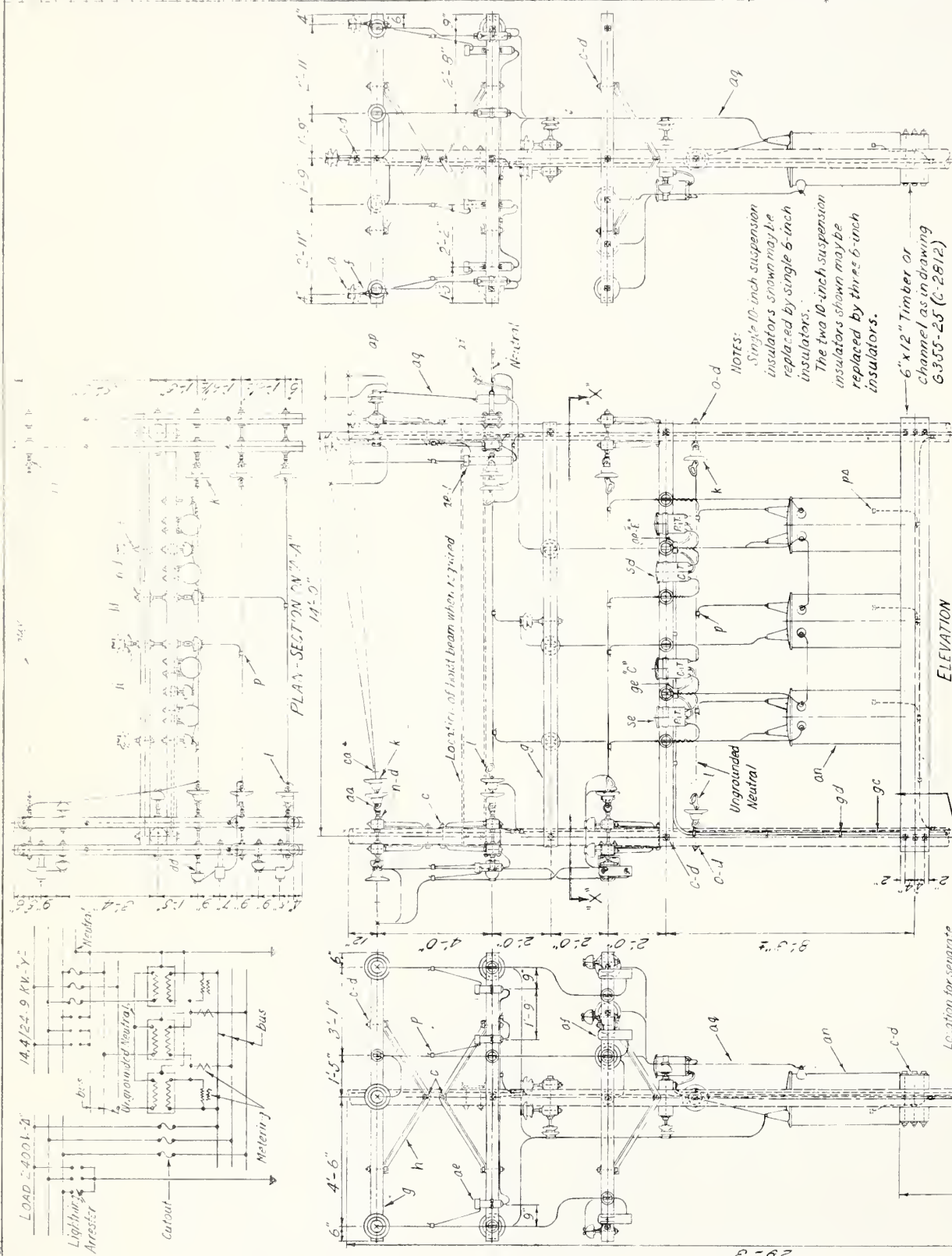
For transformers not having reduced insulation on one end of the primary winding the connections of both primary and secondary of the right hand transformer should be changed to the standard arrangement as shown on G215-5.

14.4/24.9KV. PRIMARY, 3-PHASE, 4-WIRE STAR
TWO CONVENTIONAL TRANSFORMERS
(POLE MOUNTED)

2	Transformer connections changed	5-26-X	DATE
1	Minor changes	9-7-X	REVISION

Date: Nov. 15, '49
V6215-5

LIST OF MATERIAL	
1	1/2" x 1/4" x 1/4" type
2	1/2" x 1/4" x 1/4" type
3	1/2" x 1/4" x 1/4" type
4	1/2" x 1/4" x 1/4" type
5	1/2" x 1/4" x 1/4" type
6	1/2" x 1/4" x 1/4" type
7	1/2" x 1/4" x 1/4" type
8	1/2" x 1/4" x 1/4" type
9	1/2" x 1/4" x 1/4" type
10	1/2" x 1/4" x 1/4" type
11	1/2" x 1/4" x 1/4" type
12	1/2" x 1/4" x 1/4" type
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94	1/2" x 1/4" x 1/4" type
95	1/2" x 1/4" x 1/4" type
96	1/2" x 1/4" x 1/4" type
97	1/2" x 1/4" x 1/4" type
98	1/2" x 1/4" x 1/4" type
99	1/2" x 1/4" x 1/4" type
100	1/2" x 1/4" x 1/4" type



RIGHT END ELEVATION

NOTES:
All tanks to be grounded.
Transformers of 167 kVA and larger should be at ground level.

ELEVATION

LEFT END ELEVATION

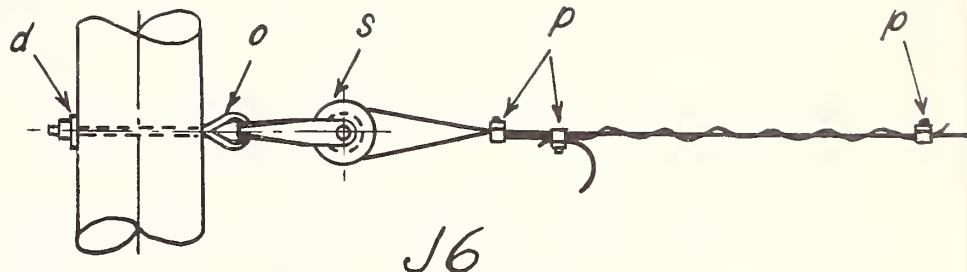
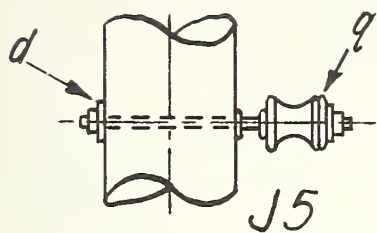
Detail showing Transformer Secondary Y Connected for 4160 Volts.

* Specify this item to be furnished by the manufacturer.

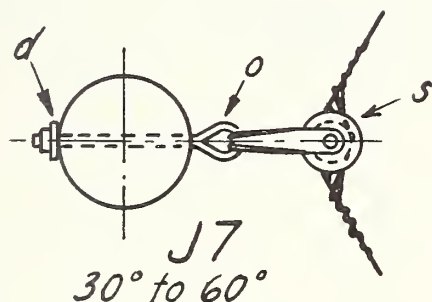
NOTE:
Secondary items indicated for 2400 volts.
Omit items not required for lower voltages.

14.4/24.9 KV PRIMARY, 3- PHASE WIRES AND NEUTRAL
THREE TRANSFORMERS ON PLATFORM

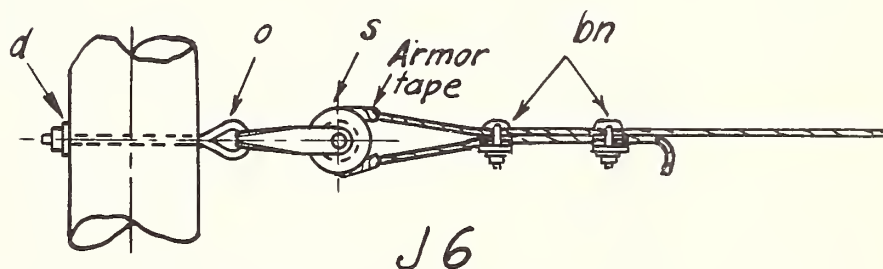
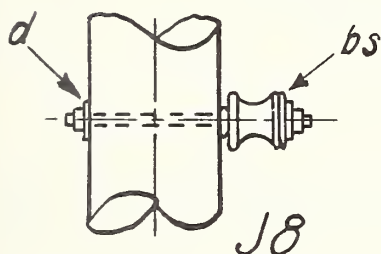
NO.	REVISION	DATE
1		Dec. 19, 1950
2		Dec. 19, 1950
3		Dec. 19, 1950
4		Dec. 19, 1950
5		Dec. 19, 1950
6		Dec. 19, 1950
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78		Dec. 19, 1950
79		Dec. 19, 1950
80		Dec. 19, 1950
81		Dec. 19, 1950
82		Dec. 19, 1950
83		Dec. 19, 1950
84		Dec. 19, 1950
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86		Dec. 19, 1950
87		Dec. 19, 1950
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90		Dec. 19, 1950
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98		Dec. 19, 1950
99		Dec. 19, 1950
100		Dec. 19, 1950



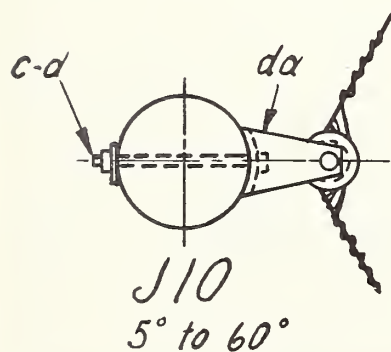
For use on copper



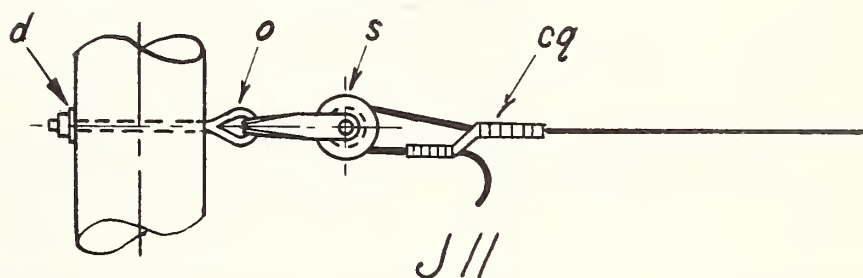
30° to 60°



For use on aluminum



5° to 60°



ITEM	NO REQ'D	MATERIAL	ITEM	NO REQ'D	MATERIAL
C		Bolt, machine, 5/8" x req'd length	cq		Sleeve, offset, splicing
d		Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	bn		Clamp, loop deadend
o		Bolt, eye, 5/8" x req'd length	da		Bracket, insulated
p		Connectors, as req'd.			
q		Bolt, double upset, insulated			
s		Clevis, secondary, swinging, insulated			
bs		Bolt, single upset, insulated			

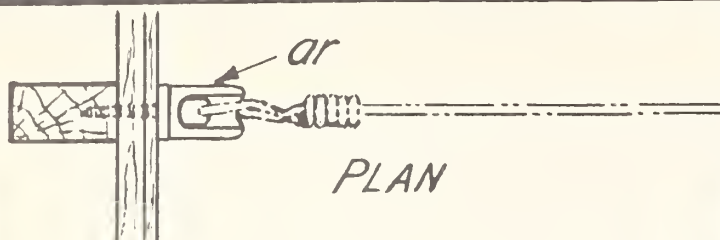
SECONDARY ASSEMBLIES

Scale: N.T.S.

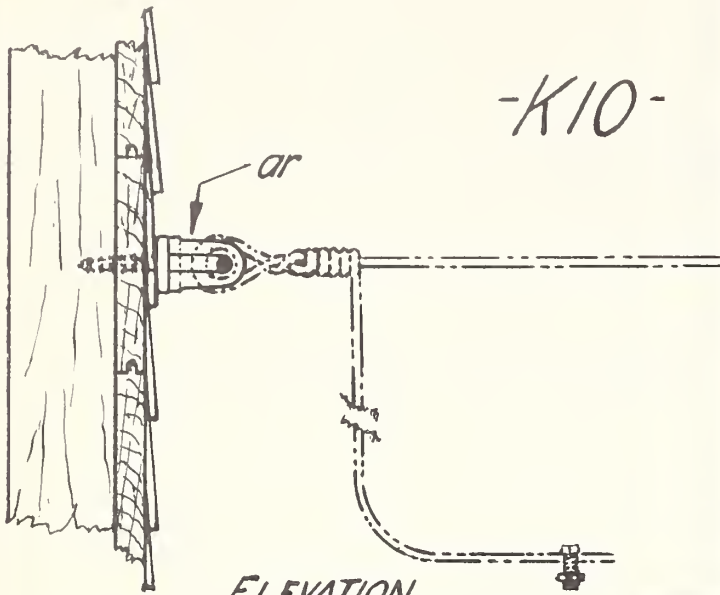
Date: June 26, 1948

No. REVISION DATE

J5 to J11

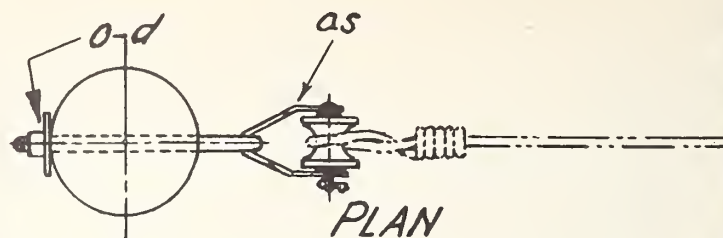


PLAN

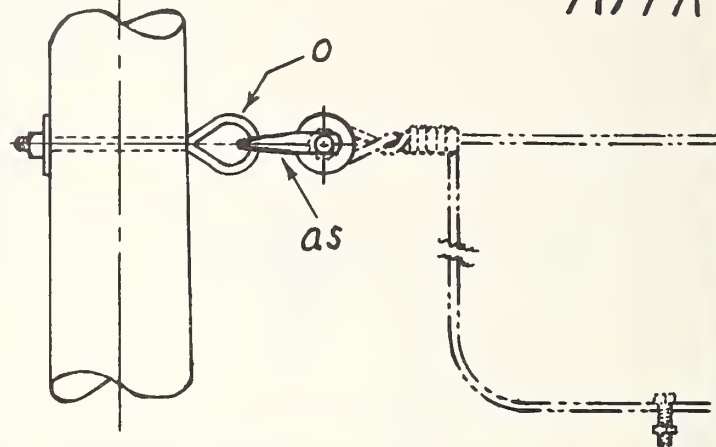


ELEVATION

-K10-

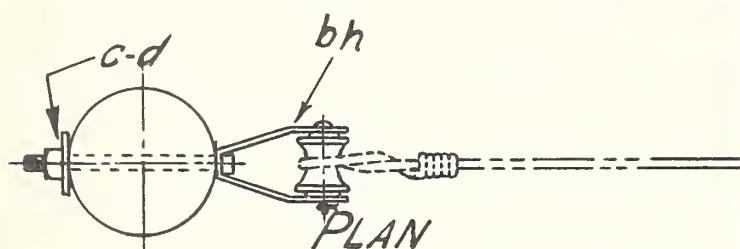


PLAN

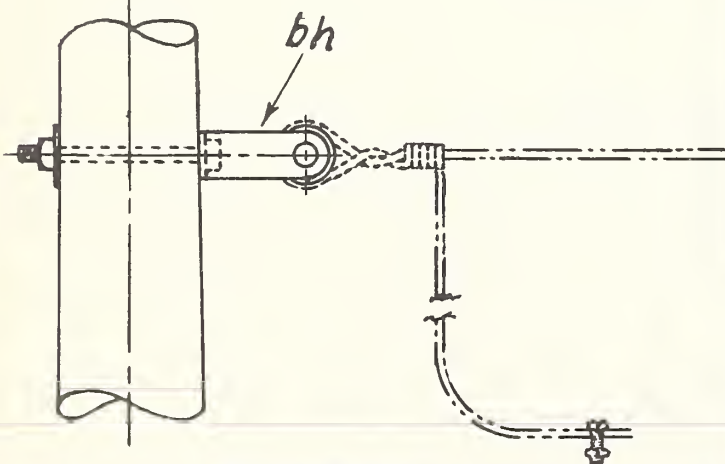


ELEVATION

-K11R-



PLAN



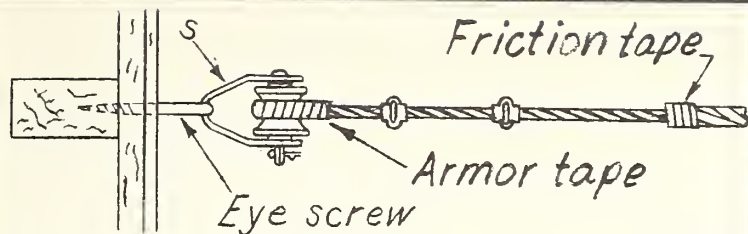
ELEVATION

-K14-

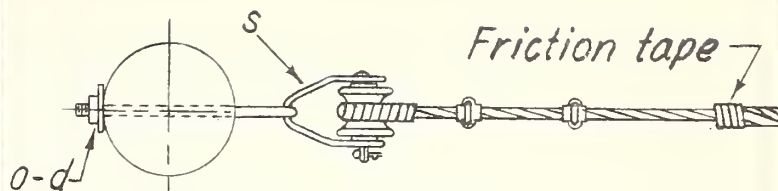
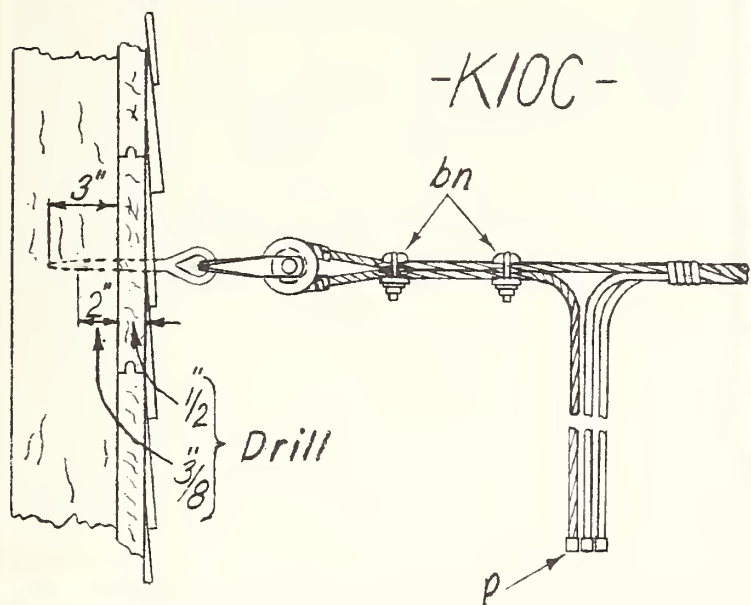
ITEM	MATERIAL	ITEM	MATERIAL
c	Bolt, machine, $\frac{5}{8}$ " x req'd length	bh	Clevis, service, deadend, insulated
d	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{16}$ " hole	o	Bolt, eye, $\frac{5}{8}$ " x req'd. length
ar	Wireholder		
as	Clevis, service, swinging, insulated		

SERVICE ASSEMBLIES

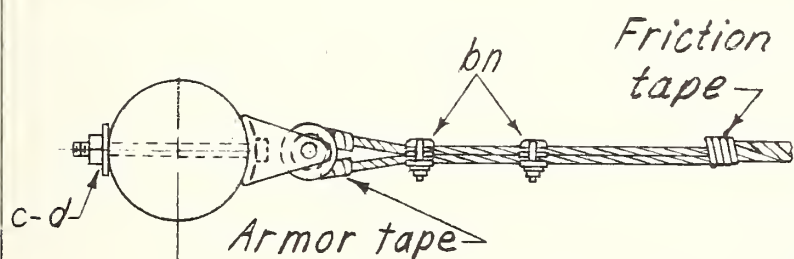
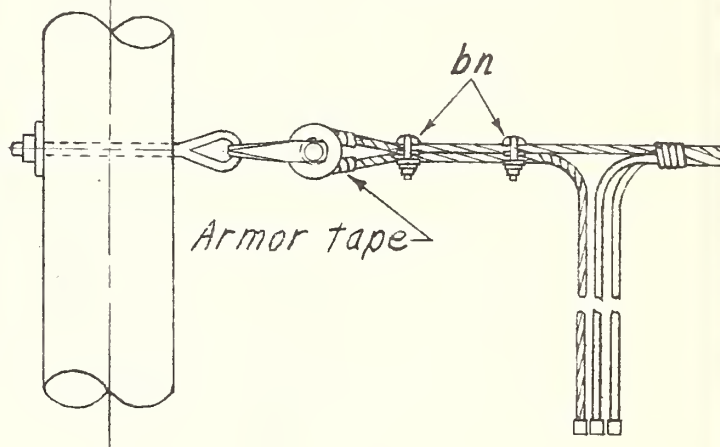
1	Changed clevis assembly	5-9-52	Scale: $1\frac{1}{2}$ " = 1'-0"	Date:
NO.	REVISION	DATE:		K10, K11R, K14



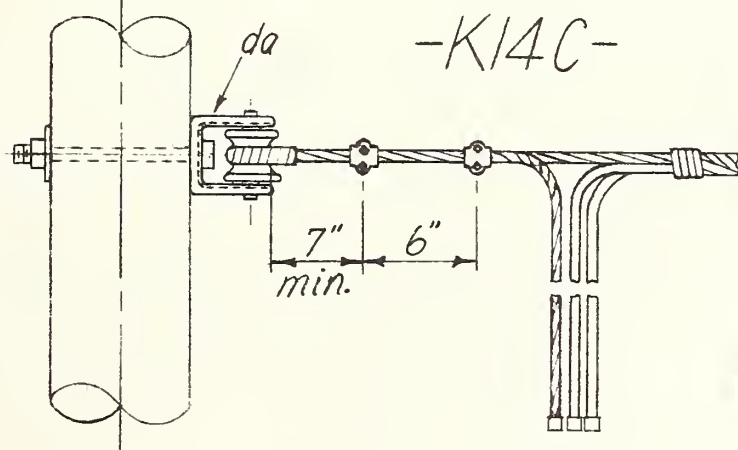
-K10C-



-K11C-



-K14C-



NOTES:

This type construction should be used for 3-conductor service cables with bare A.C.S.R. neutral.

Eye screw to be wrenched in.

For brick or concrete walls use 3/4" x 3 1/2" expansion shield in 3/4" x 4" hole.

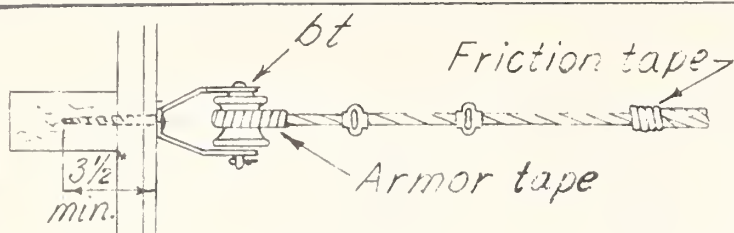
ITEM	MATERIAL	ITEM	MATERIAL
c	Bolt, machine, 5/8" x req'd length	bn	Clamp, loop deadend
d	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	da	Bracket, insulated
o	Bolt, eye, 5/8" x req'd length	da	Screw, eye, elliptical, 1/2" x 6"
s	Clevis, secondary, swinging, insulated	p	Connectors, as required

SERVICE ASSEMBLIES, CABLE

Scale: 1 1/2" = 1'-0"

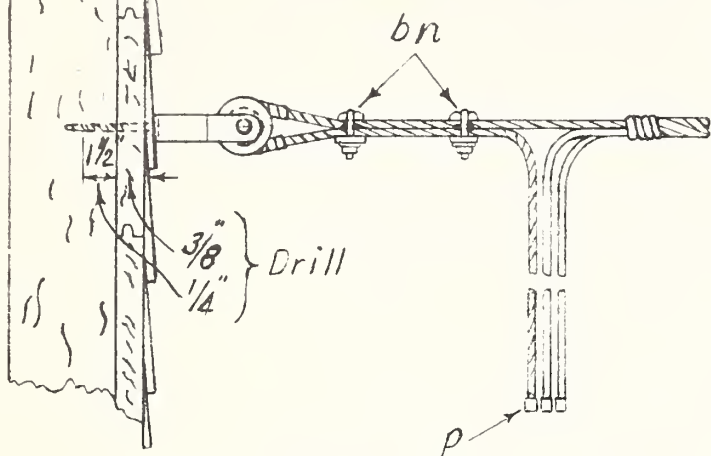
Date: Jan. 21, 1952

NO.	REVISION	DATE	K10C, K11C, K14C
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Note:

Groove diameter of insulator 1 3/4" min.



Note:

This type construction should be used for 3-conductor service cables with bare ACSR neutral.

ITEM	MATERIAL
bt	Wireholder, clevis type, #24 woodscrew, insulated
p	Connectors, as required
bn	Clamp, loop deadend

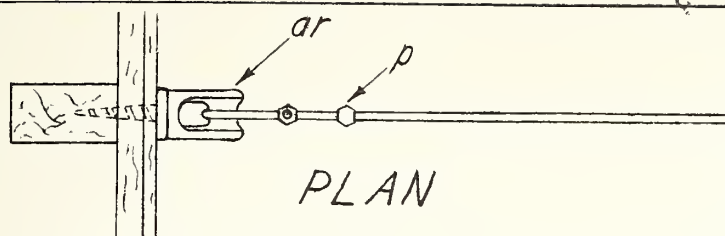
ITEM	MATERIAL

SERVICE ASSEMBLY, CABLE

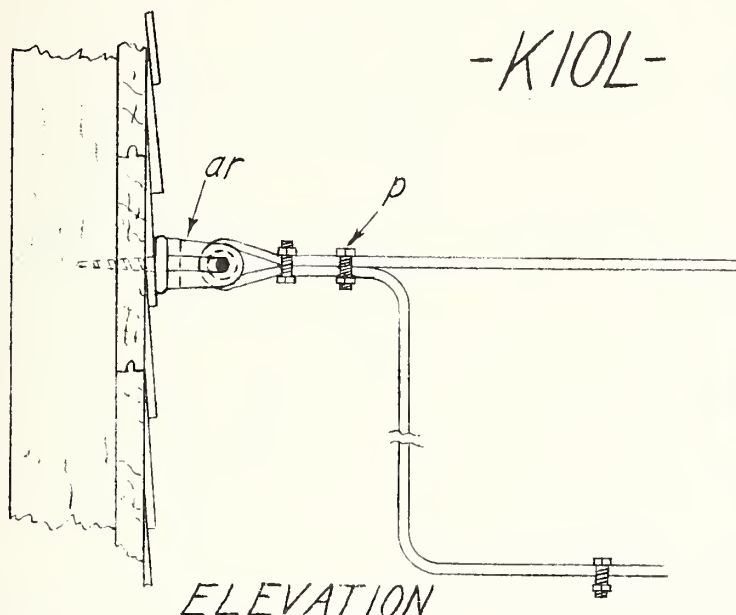
Scale: 1" = 1'-0"

Date: Dec. 29, 1952

K10C-A

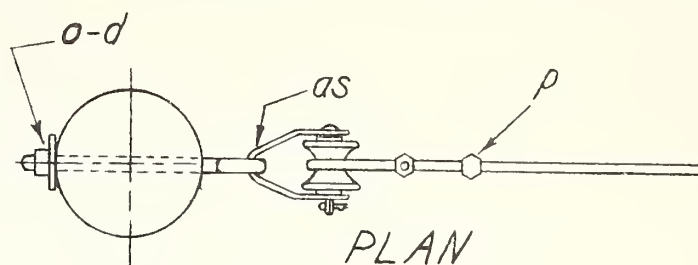


PLAN

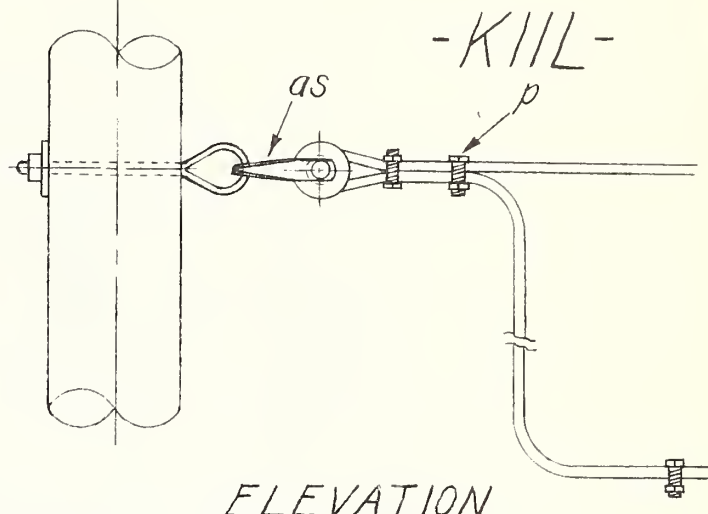


ELEVATION

-K10L-

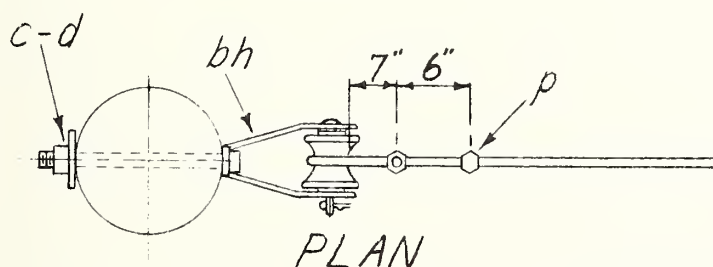


PLAN

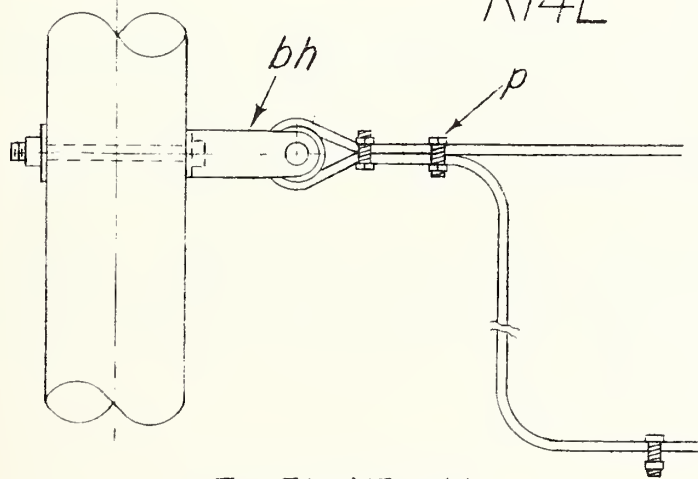


ELEVATION

-K11L-



PLAN



ELEVATION

-K14L-

NOTE 1:

This type construction should be used for No. 2 aluminum weather-proof conductor and larger.

NOTE 2:

Connectors to be applied over bare wire and then taped as required.

ITEM	MATERIAL	ITEM	MATERIAL
c	Bolt, machine, $\frac{5}{8}$ " x req'd length	bh	Clevis, service, deadend, insulated
d	Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{16}$ " hole	p	Connectors, as required
ar	Wireholder	o	Bolt, eye, $\frac{5}{8}$ " x req'd. length
as	Clevis, service, swinging, insulated		

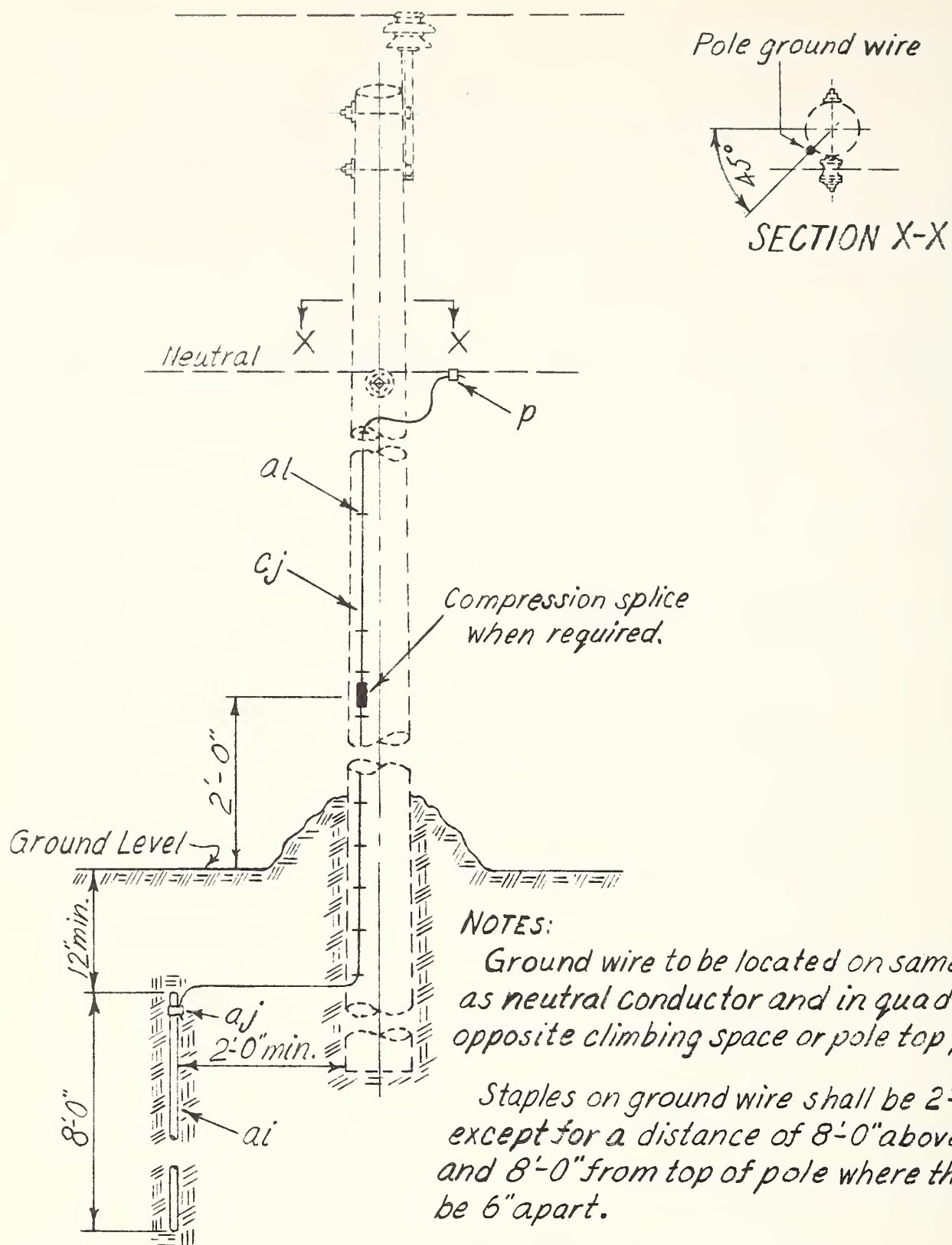
SERVICE ASSEMBLIES

Scale: $\frac{1}{2}$ " = 1'-0"

(LARGE CONDUCTORS)

Date: Jan. 16, 1952

NO.	REVISION	DATE	K10L, K11L, K14L
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ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
p	1	Connector	cj	1	Ground wire, #6 S.D. Copper or equiv.
ai	1	Rod, ground, 5/8" dia. min.			
aj	1	Clamp, ground rod			
al		Staples, ground wire, 3/16" x 1 1/2" x #9, as reqd.			

GROUNDING ASSEMBLY-GROUND ROD TYPE

Scale: 1/2"=1'-0"

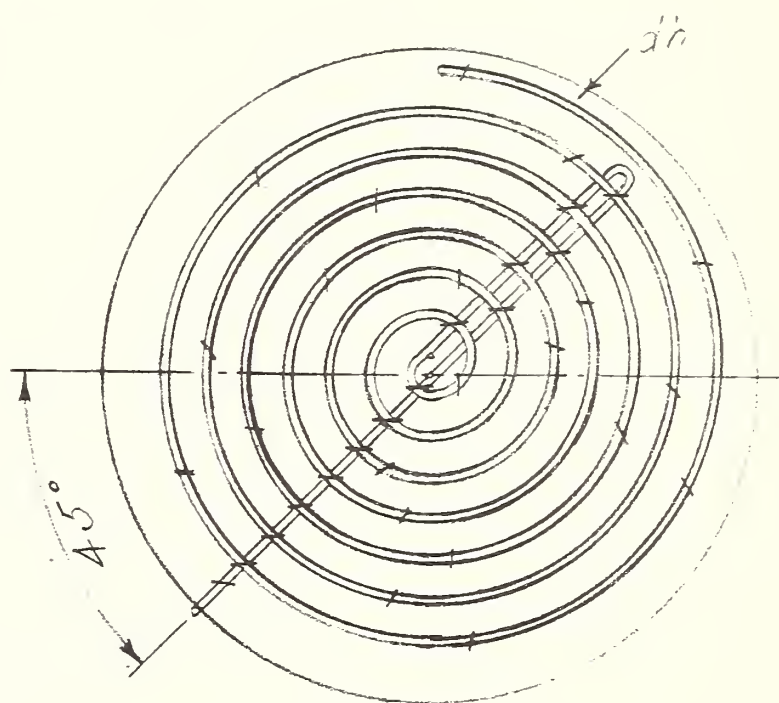
Date: May 20, 1953

NO.	REVISION	DATE:	VM2-11
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Pole ground wire



SECTION X-X



PLAN OF COIL TYPE GROUND.

Scale: 3"=1'-0"

NOTES:

Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.

Staples on ground wire shall be 2'-0" apart, except for a distance of 8'-0" above ground and 8'-0" from top of pole where they shall be 6" apart.

ITEM	NO. REQD	MATERIAL	ITEM	NO. REQD	MATERIAL
p	1	Connector			
al		Staples, ground wire, $\frac{3}{16} \times 1\frac{1}{2} \times \#9$, as reqd.			
cj	1	Ground wire, $\#6$ S.D. Copper or equivalent			
dh	1	Butt type grounding device, coil or plate			

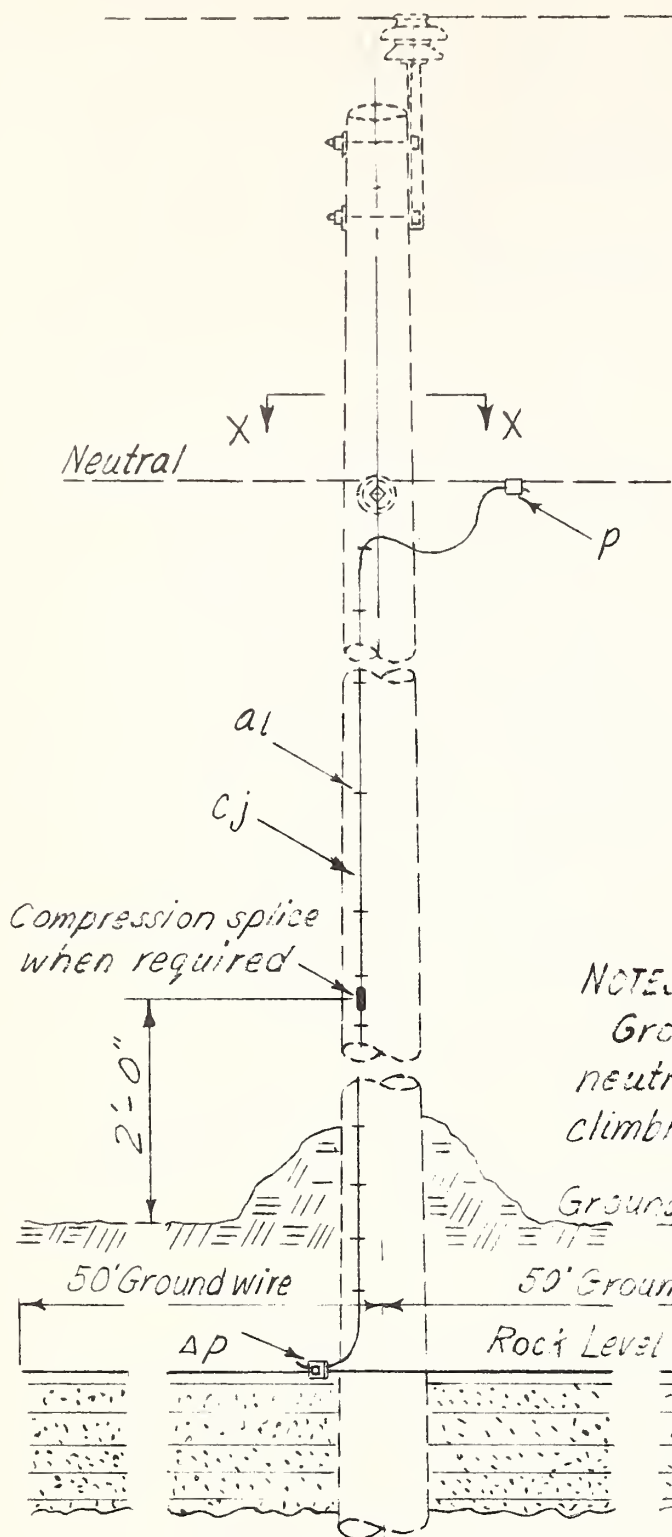
POLE GROUNDING ASSEMBLY-BUTT TYPE
(COIL, PLATE OR ROD)

Scale: $\frac{1}{2}$ "=1'-0"

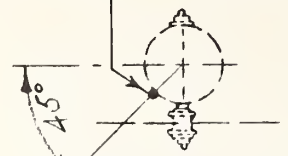
Date: May 19, 1953

NO. REVISION DATE:

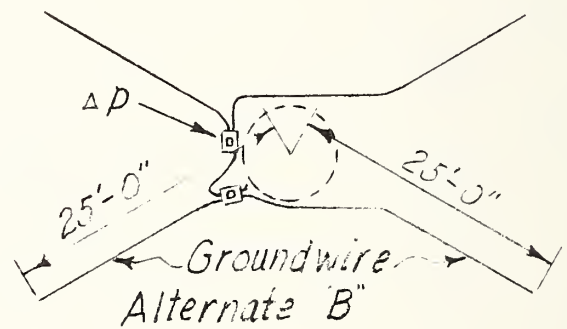
VM2-12



Pole ground wire



SECTION X-X



NOTES:

Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.

Staples on ground wire shall be 2'-0" apart except for a distance of 8'-0" above ground and 3'-0" from top of pole where they shall be 5" apart.

18" required wherever possible

Alternate A

NOTE:

Butt type grounding device, coil or plate, may be used in addition.

ITEM	NO. REQD	MATERIAL	ITEM	NO. REQD	MATERIAL
p	1	Connector	ΔP		Clamp, ground wire, parallel groove
al		Staples, ground wire, 3/16" x 1 1/2" x #9 as reqd.			
cj	1	Ground wire, #6 S.D. Copper or equiv. ht.			

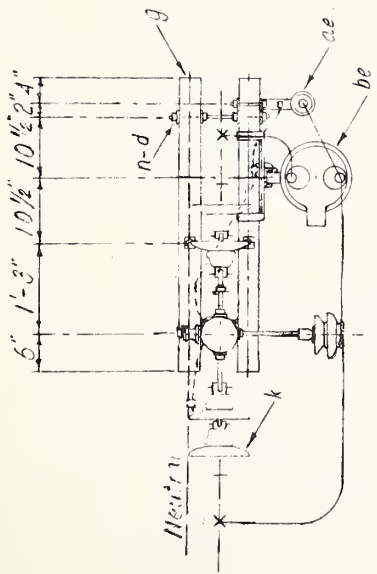
GROUNDING ASSEMBLY-TRENCH TYPE

Scale: 1/2" = 1'-0"

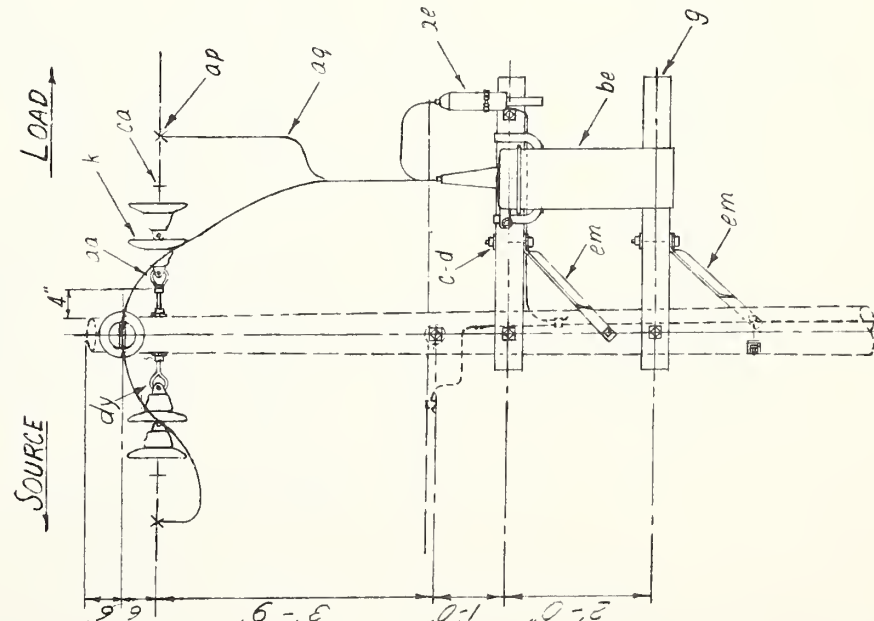
Date: May 22, 1953

VM 2-13

NO. REVISION DATE:



PLAN



ELEVATION

SIDE ELEVATION

ITEM	NO.	MATERIAL
a	1	Insulator, pin type
c	7	Bolt, machine, 5/8" reg'd. length
d	16	Washer, 2 1/4" x 5/16" x 5/16" hole
g	3	Crossarm, 2 1/2" x 4 1/2" x 4'-3"
k	4	Insulator, suspension 10"
n	3	Bolt, double arm, 5/8" x reg'd. length
p		Connectors, as required
aa	1	Nut, eye, 5/8"
ap	2	Clamp, hot line, tap assembly
ae	1	Lightning arrester
aq		Jumpers and leads as required
be	1	Recloser, oil circuit
bs	1	Bolt, single upset, insulated
ca	2	Feedend, assembly primary
dy	1	Bolt, eye, double arm, 1 1/2" x 1 1/2" x 3/8" angle
em	4	Bra's, crossarm, 1 1/2" x 1 1/2" x 3/8" angle
dn	1	Hanger, T-crossarm, as required
dd	1	Adapter, insulator

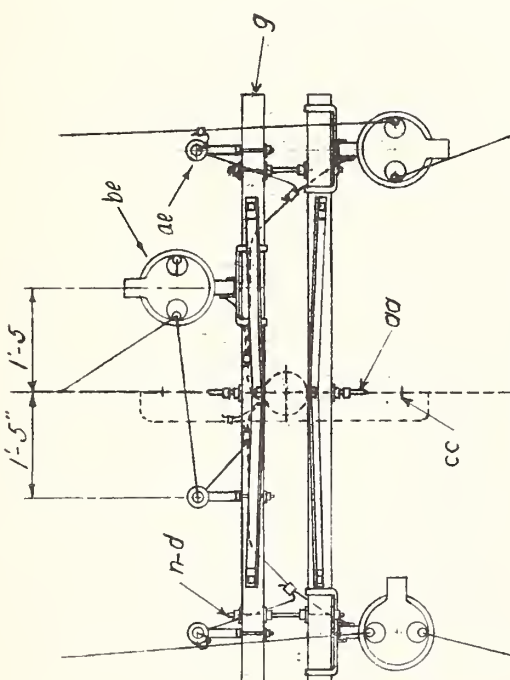
* Specify this item to be furnished by the manufacturer

NOTE:

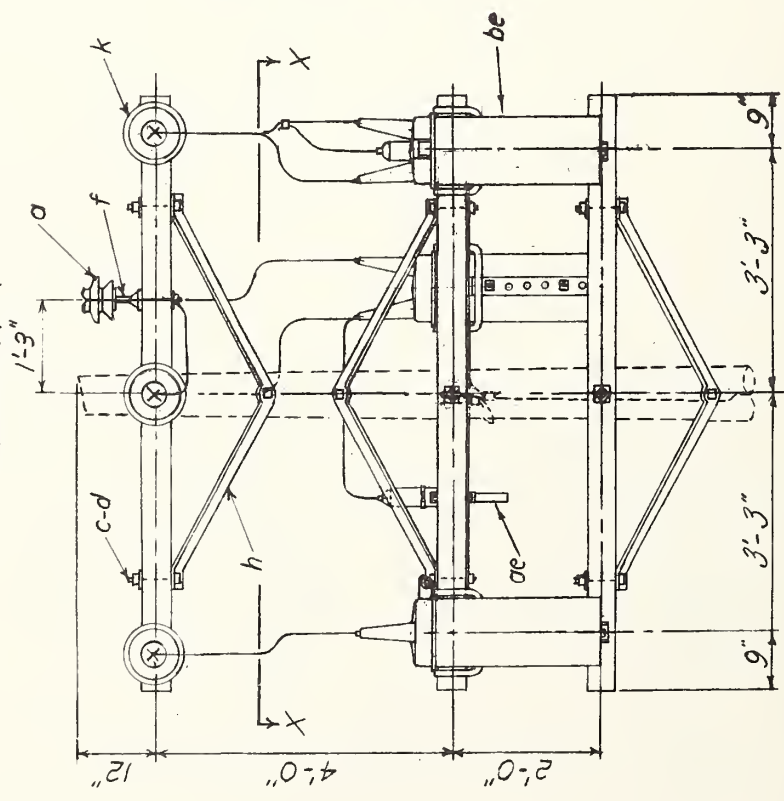
1. The recloser terminal bushing connected directly to the coil should be connected to the source. Where necessary to provide for this connection the recloser may be mounted on the other side of the pole and the neutral deenergized.
2. Where suitable hanger is not furnished with the recloser a standard transformer hanger may be used as indicated.
3. The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.

14.4/24.9 KV PRIMARY, 1-PHASE 2-WIRE NEUTRAL GROUND
ONE SECTIONALIZING OIL CIRCUIT RECLOSER

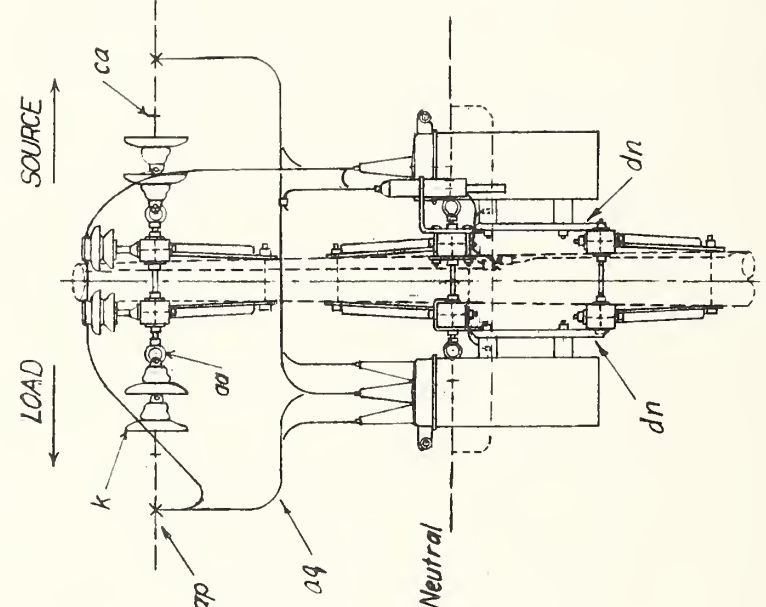
1	Change (crossarm to standoff pin)	22/10	DATE:
2			
REVISION			
		Scale: 1/2"=1'-0"	Order No. 23149
			VM3-10R6



SECTION X-X



Where suitable hanger is not furnished with the recloser a standard transformer hanger may be used as indicated.



ELEVATION

SIDE ELEVATION

* Specify this item to be furnished by the manufacturer.

Note:

When required to facilitate connection of the source lead to the coil bushing, the positions of the recloser and lightning arrester on the middle phase should be interchanged and the other two reclosers rotated as required.
The two 10-inch suspension insulators shown may be replaced by three 6-inch insulators.

ITEM	NO.	MATERIAL
a	2	Insulator, pin type
c	6	Bolt, machine, $\frac{3}{8}$ " reqd. length
c	12	Bolt, machine, $\frac{1}{2}$ " reqd. length
d	30	Washer, $2\frac{1}{4} \times 2\frac{1}{4} \times \frac{3}{16}$, 13" hole
d	12	Washer, $1\frac{3}{8}$ diam., $\frac{9}{16}$ " hole
f	2	Pin, crossarm, steel, $\frac{5}{8} \times 14$ "
g	6	Crossarm, $3\frac{1}{2} \times 4\frac{1}{2} \times 8'-0"$
h	6	Brace, angle, $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{3}{16}$ " angle
k	12	Insulator, suspension, 10"
n	9	Bolt, double arming, $\frac{5}{8}$ " reqd. length
p		Connectors as reqd.
aa	8	Nut, eye, $\frac{5}{8}$ "
ap	6	Clamp, hot line tap assembly
aq		Jumpers and leads as reqd.
be	3	Recloser, oil circuit
ca	6	Deadend assembly, primary
cc	2	Deadend assembly, neutral
ac	3	Arrester, lightning
dn	3	Hanger, T-crossarm, as required *

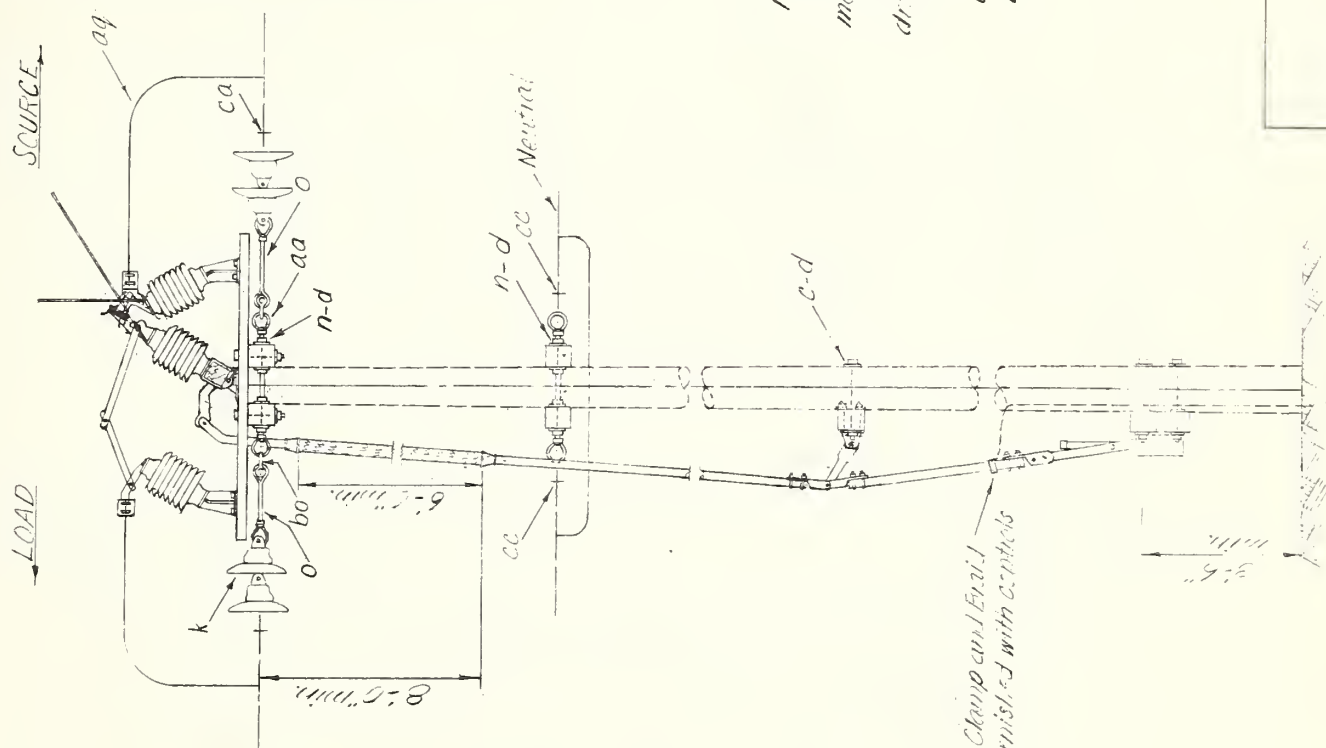
14.424.9KV PRIMARY, 3-PHASE 4-WIRE STAR
THREE SECTIONALIZING OIL CIRCUIT RECLOSERS

Scale: $\frac{1}{2} = 1'-0"$

Date: Dec. 18, 50

VM 3-12 RI

No.	REVISION	DATE
1		



ITEM	NO. REQD.	MATERIAL
C	6	Bolt, machine, $\frac{1}{2}$ " x reg'd. 17th.
C	16	Bolt, machine, $\frac{3}{8}$ " x reg'd. 17th.
O	2	Washer, $2 \times 2 \times \frac{1}{8}$, 9th hole
J	42	Washer, $2 \frac{1}{4} \times 2 \frac{1}{4} \times \frac{3}{16}$, 14th hole
Q	5	Crossarm, $3 \frac{1}{2} \times 4 \frac{1}{2} \times 6 \text{--}0$
Q	2	Crossarm, $3 \frac{1}{4} \times 4 \frac{3}{4} \times 10 \text{--}0$
K	12	Insulator, suspension, 10"
N	4	Bolt, double arm, $\frac{3}{8}$ " x reg'd. 17th.
P		Connections, as reg'd.
aa	14	Nut, eye, $\frac{3}{8}$ "
ag		Jumpers or Leads as reg'd.
bo	6	Shackles, anchor
ca	6	Deadend assembly, primary
cc	2	Deadend assembly, neutral
cg	3	Switch, subbreak, 3 pole unit
		23 KV with operating mechanism
O	6	Bolt, eye, $\frac{3}{8}$ " x reg'd. length

Operating handle to be provided with means of locking (Padlock)

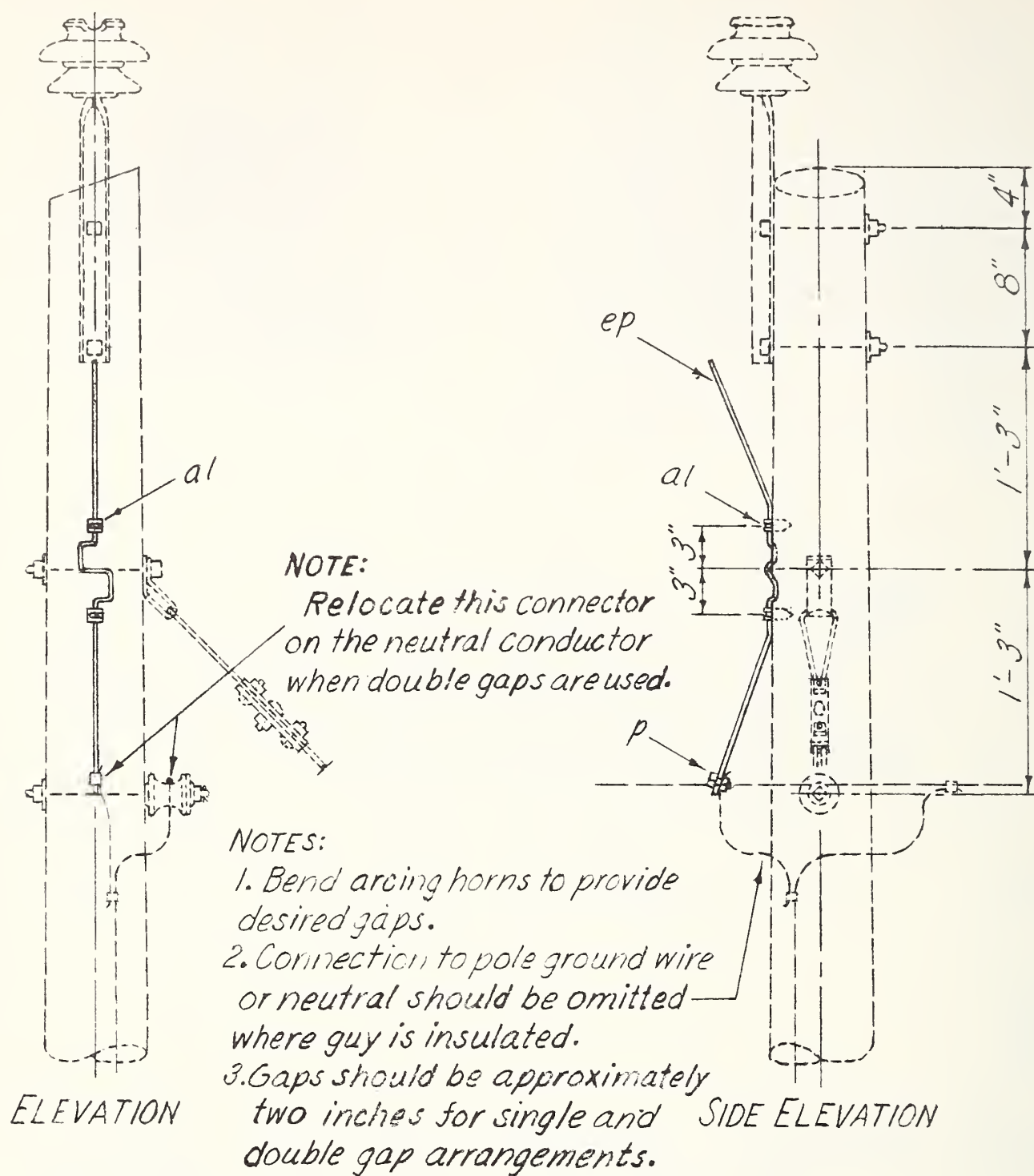
The two 16-inch suspension insulators shown may be replaced by three 6-inch insulators.

Ground Clamp and Enail —
to be furnished with centers

14.4/24.9 Kv. PRIMARY, 3-PHASE 4-WIRE STAR SECTIONALIZING AIR BREAK SWITCH

2-16-2017

1-2-15



ITEM NO.	RECD.	MATERIAL	ITEM NO.	RECD.	MATERIAL
p		Connectors, as required			
al	2	Ground wire clip			
ep	2	Arising horn, No. 4 H.D. Copper or equiv.			
			14. 4/24.9KV. PRIMARY, 1-PHASE 2-WIRE NEUTRAL GROUNDED VERTICAL CONSTR. 0° TO 5° ANGLE, ARCING HORN ASSEMBLY		
			Scale: 1"=1'-0" (WIRE TYPE)		
			Date: July 16, 1951		
			VM10-14		
NO.	REVISION	DATE:			

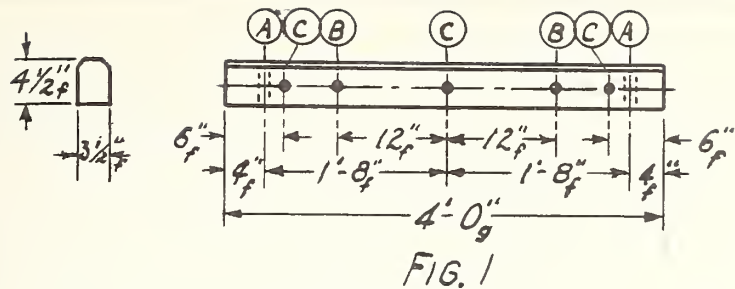


FIG. 1

TOLERANCES - SIZES OF HOLES

	Nominal	Go	No Go
(A) For Wood Pins	1 7/32"	1 1/2"	1 9/16"
For Steel Pins	1 1/16"	5/8"	3/4"
(B)	7/16"	3/8"	1/2"
(C)	1 1/16"	5/8"	3/4"
(D)	9/16"	1/2"	5/8"

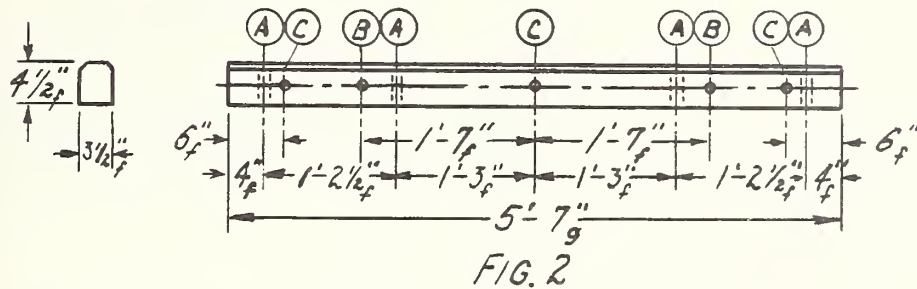


FIG. 2

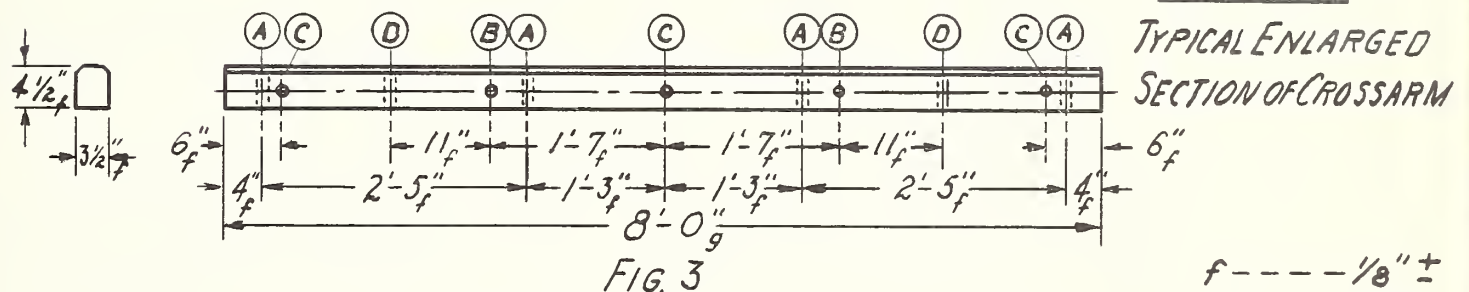
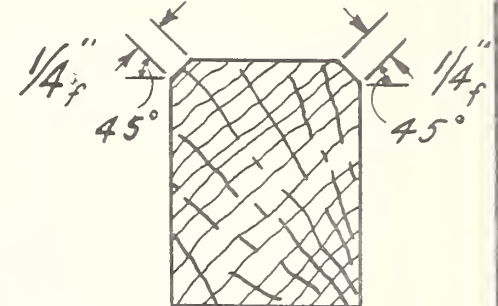


FIG. 3

TYPICAL ENLARGED SECTION OF CROSSARM

f ----- 1/8" ±
g ----- 1/4" ±

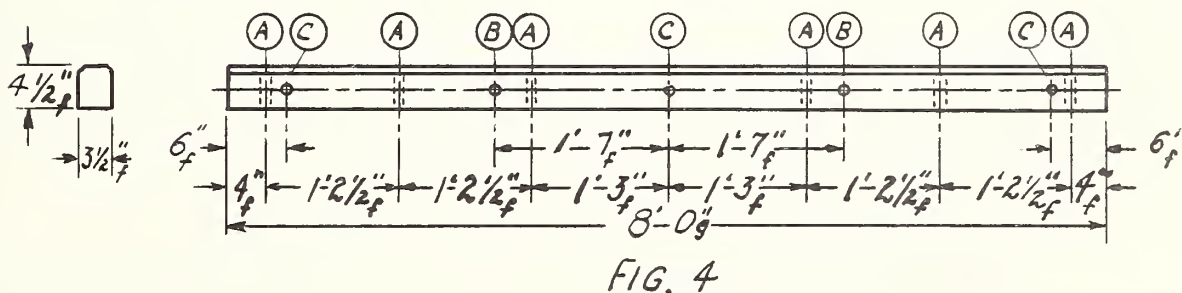


FIG. 4

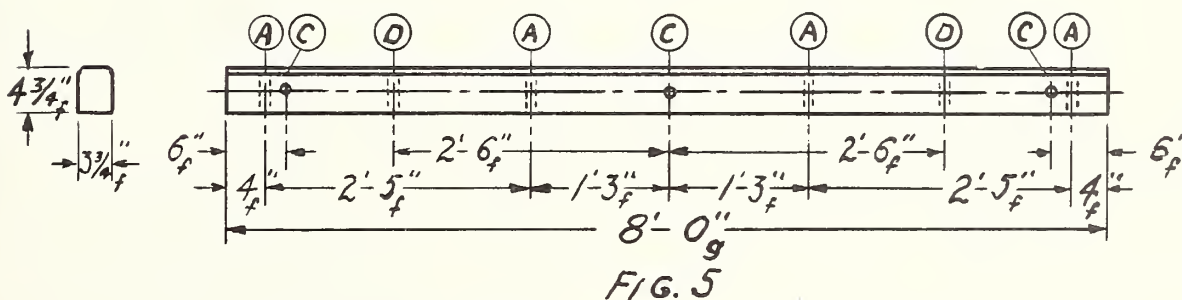


FIG. 5

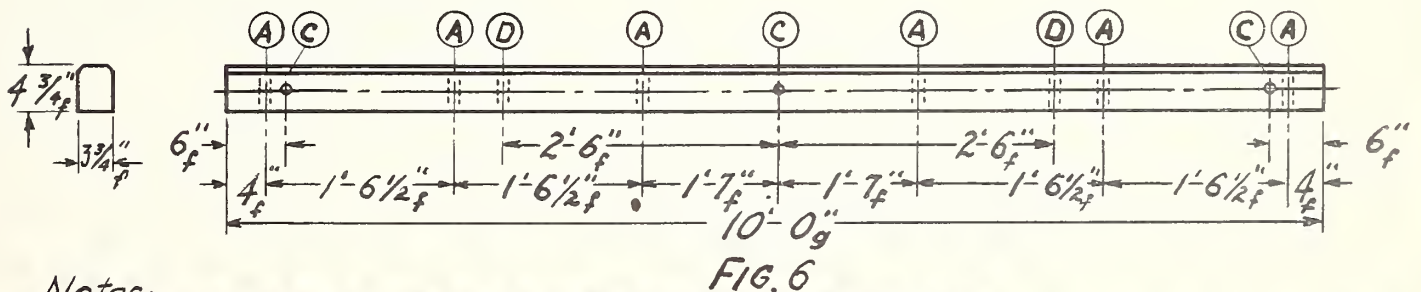


FIG. 6

Notes:

1. Drilling shall be for steel pins unless otherwise specified.
2. Eight foot crossarms may be drilled for 42" span angle braces, if so specified.

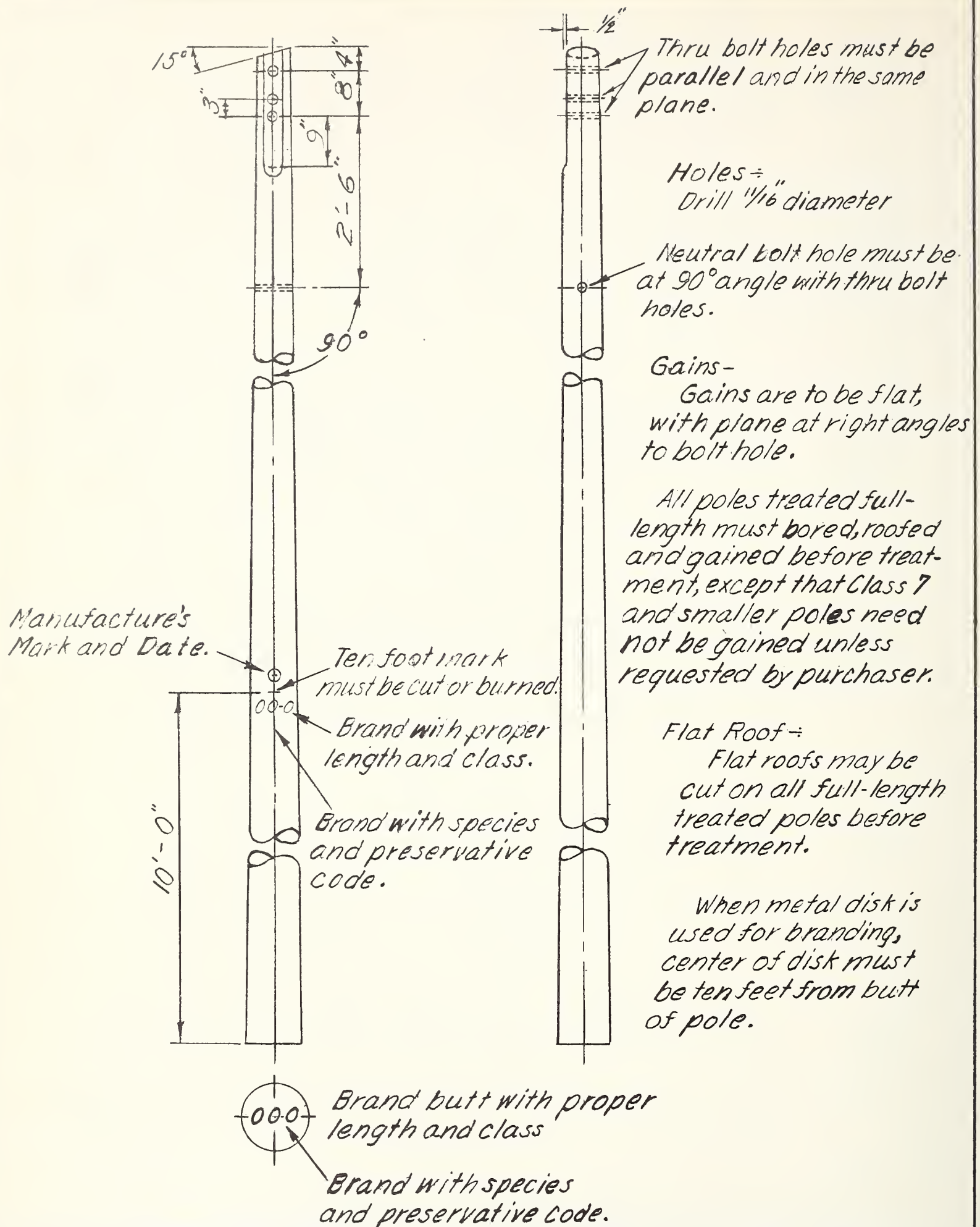
CROSSARM DRILLING GUIDE

Scale: 1/2" = 1'-0"

Date: Apr. 14, '48.

No. REVISION Date

M19 R



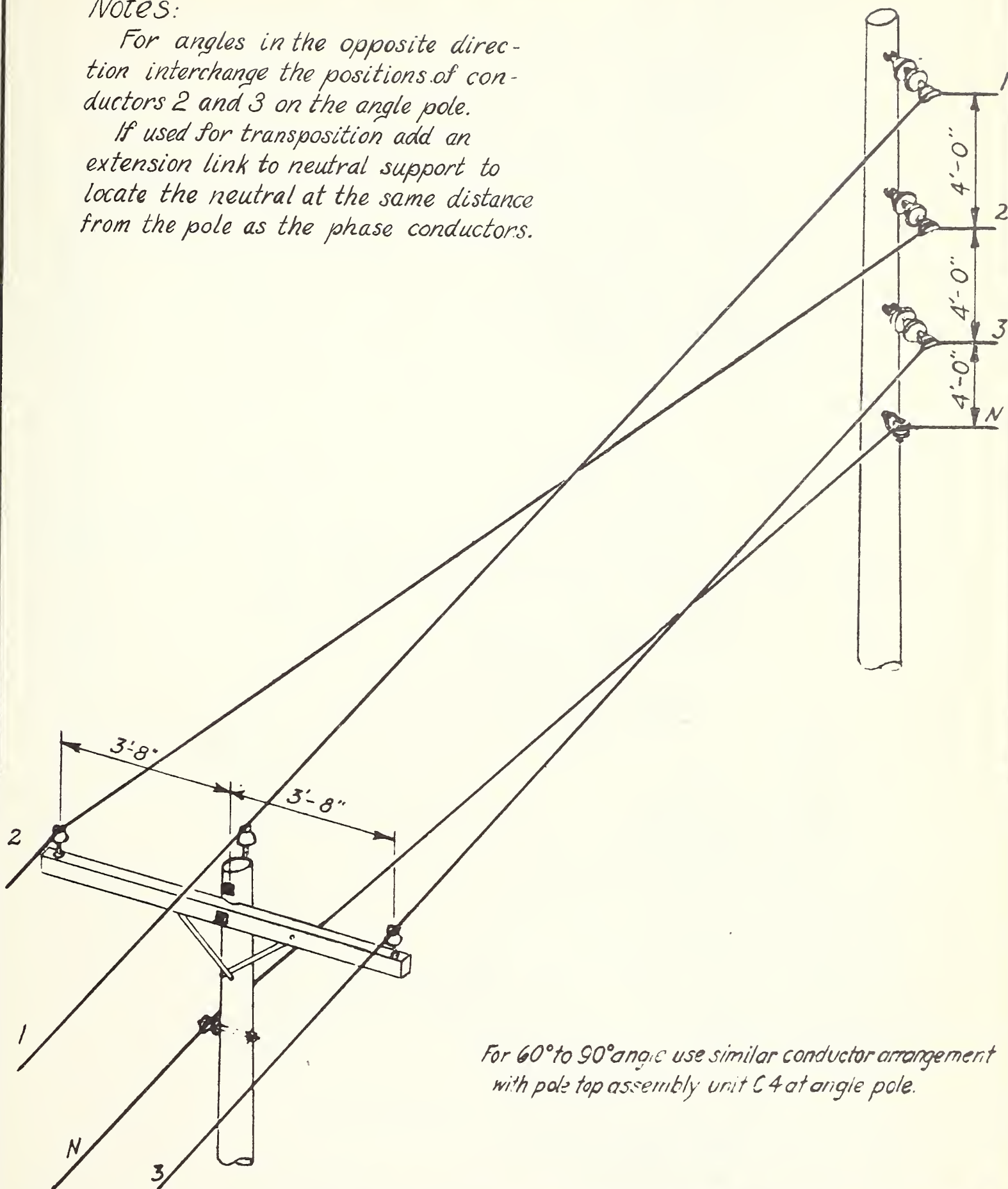
POLE FRAMING

2	Deleted hole	1-22-52	Scale: 1/2"=1'-0"	Date: July 5, 1949
1	Added holes	8-23-51		
No.	REVISION	DATE:		M20RI

Notes:

For angles in the opposite direction interchange the positions of conductors 2 and 3 on the angle pole.

If used for transposition add an extension link to neutral support to locate the neutral at the same distance from the pole as the phase conductors.



For 60° to 90° angle use similar conductor arrangement with pole top assembly unit C 4 at angle pole.

-----KV. PRIMARY, 3-PHASE, 4-WIRE STAR
CROSSARM TO VERTICAL CONSTRUCTION - 30° TO 60° ANGLE

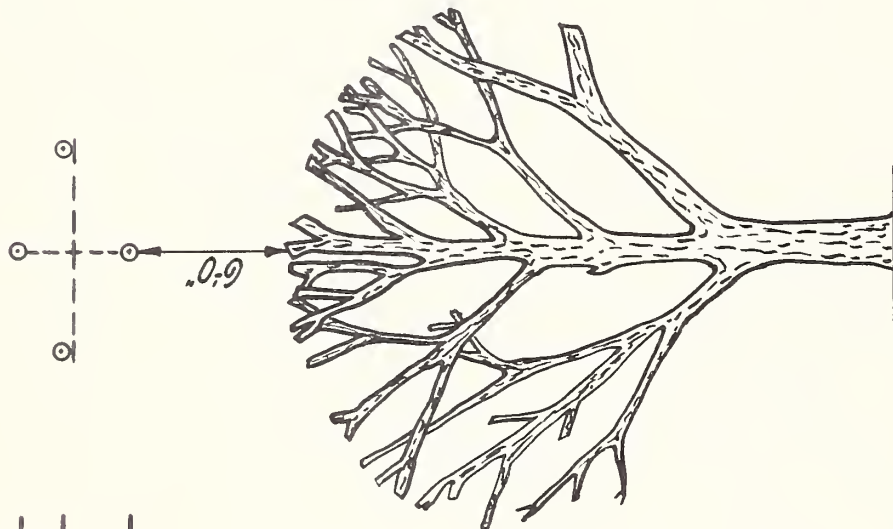
Not to Scale

Date:

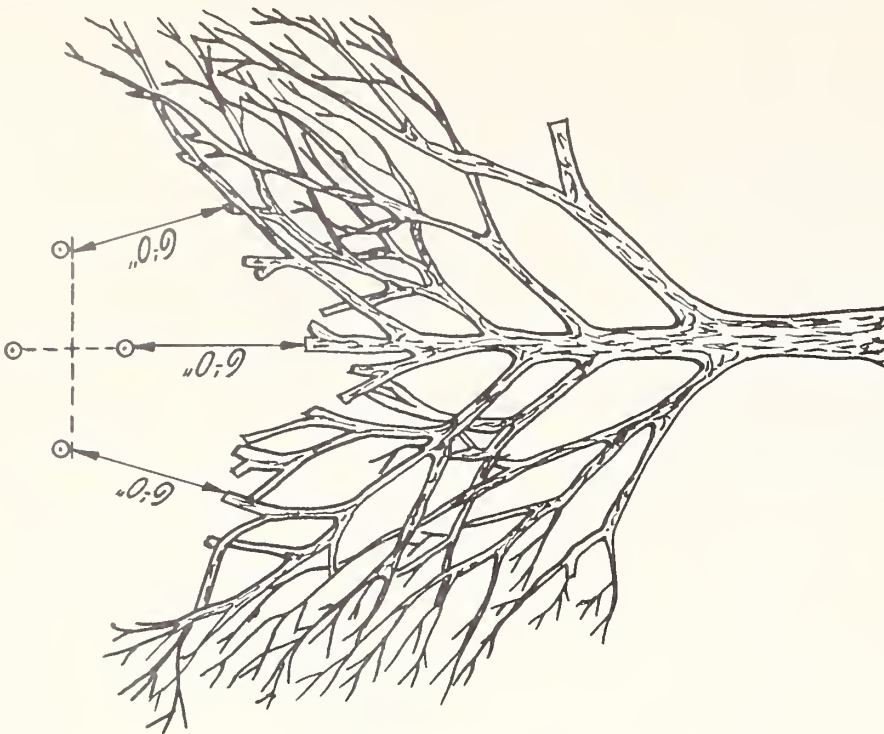
M 21 R



Before Trimming



Right Way



Wrong Way

NOTE:
 No parts of tree should be closer than 6" from open wiring.
 Trimming should leave tree with symmetrical appearance.

TREE TRIMMING GUIDE

Not to scale

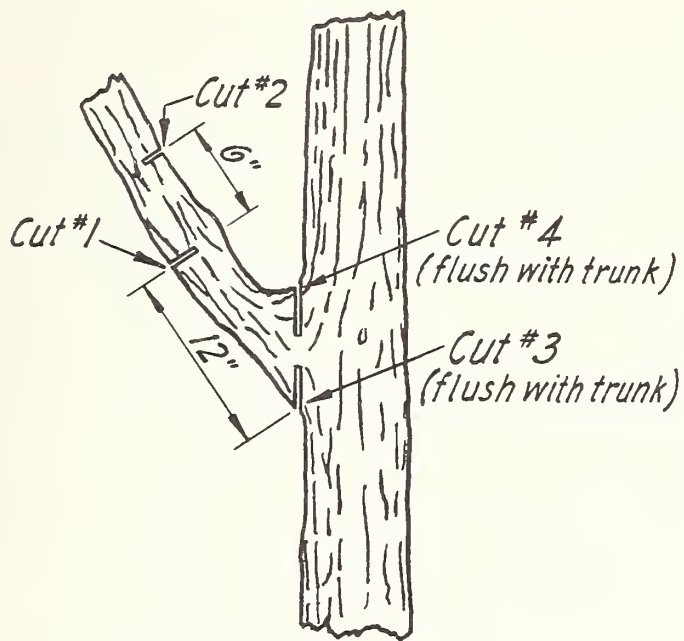
Date:

M22-1

No.

REVISION

DATE:



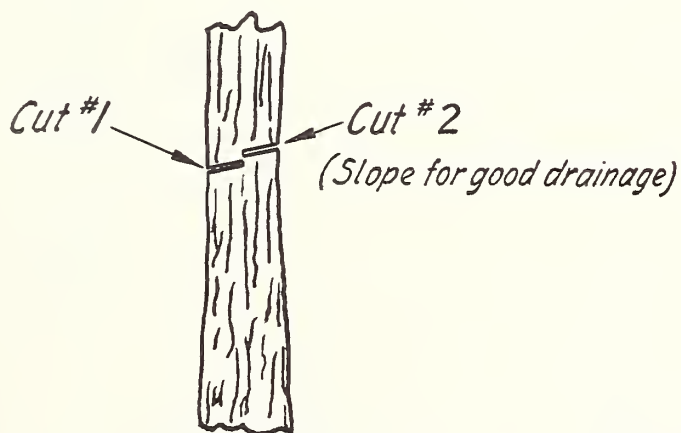
Right Way



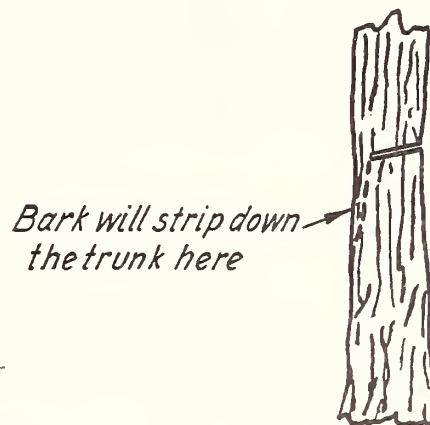
Wrong Way

*For small branches
omit Cuts #1 and #2*

REMOVAL OF HEAVY SIDE LIMB



Right Way



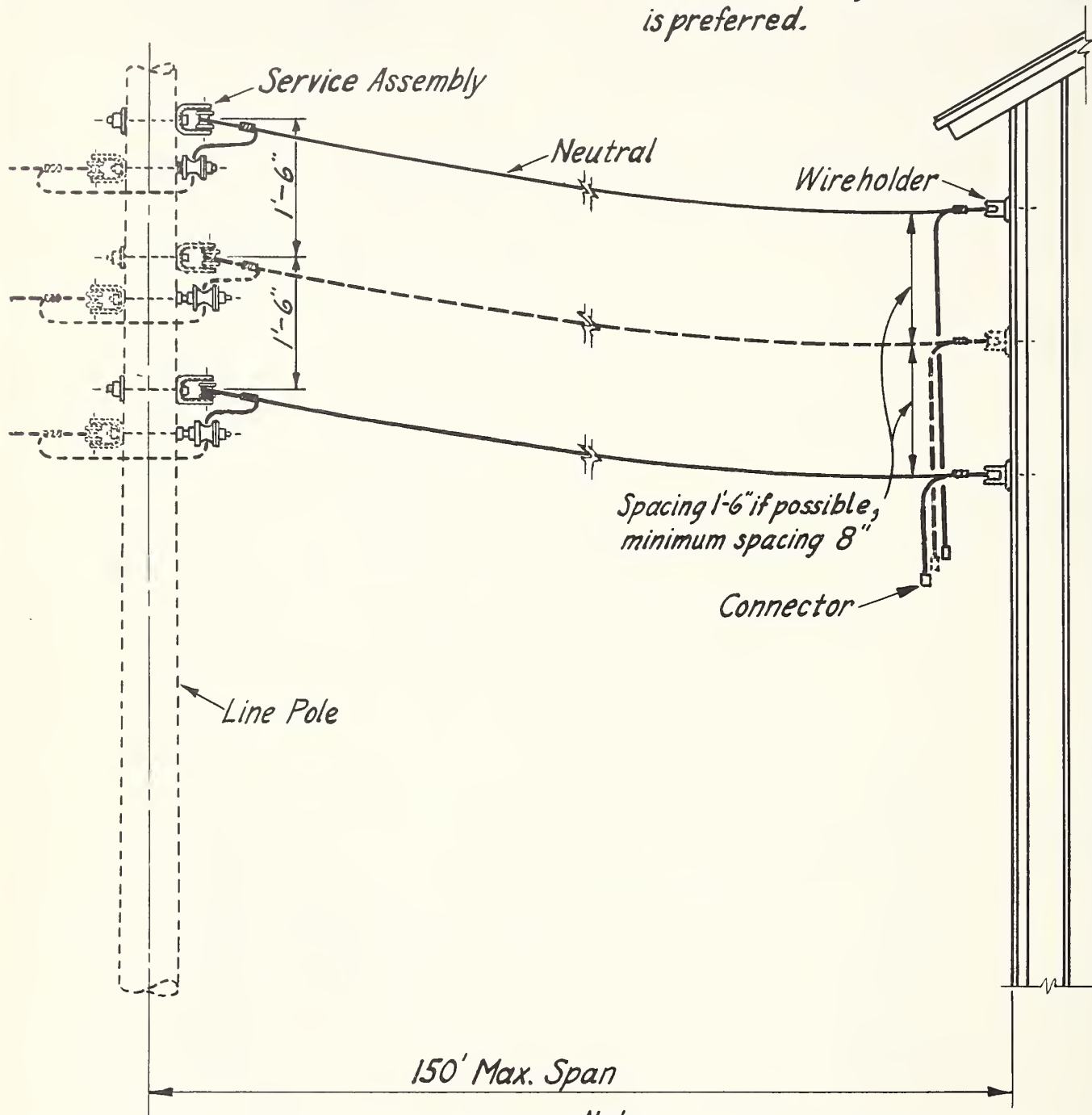
Wrong Way

REMOVAL OF VERTICAL LIMB

NOTE: Coat final cut with tree paint.

			TREE TRIMMING GUIDE	
			Not to scale	Date:
NO.	REVISION	DATE		M22-2

Vertical Arrangement of Wireholders
as shown is permissible.
Horizontal Arrangement (as shown on Dwg. M24-2)
is preferred.



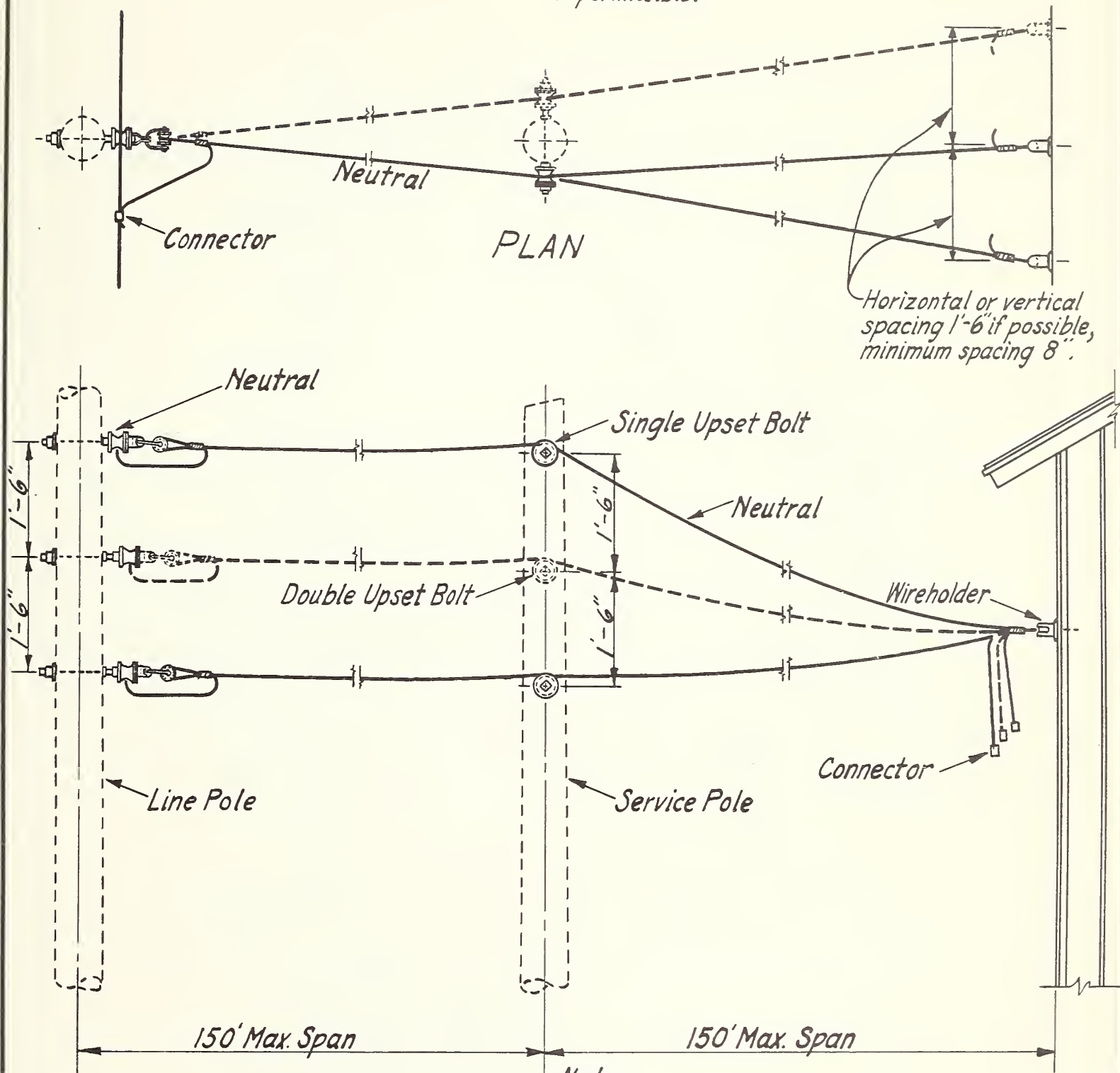
Notes:
Insulation on covered conductor that is
under strain should not be cut.
In brick or concrete walls use $\frac{3}{8}$ " expansion
bolts or shields in $\frac{1}{8}$ " holes at least $2\frac{1}{2}$ " deep,
or wedge expanded eyebolts.

This drawing to be used as a guide
and not for bidding purposes.

SERVICE ASSEMBLY GUIDE

1. Added note	6/15/48	Scale: $\frac{1}{2}$ " = 1'-0"	Date:
No. REVISION	Date:		M24-1

Horizontal Arrangement of Wire holders as shown is preferred,
Vertical Arrangement (as shown on Dwg. M24 -1)
is permissible.



Notes:

Insulation on covered conductor that is under strain should not be cut.

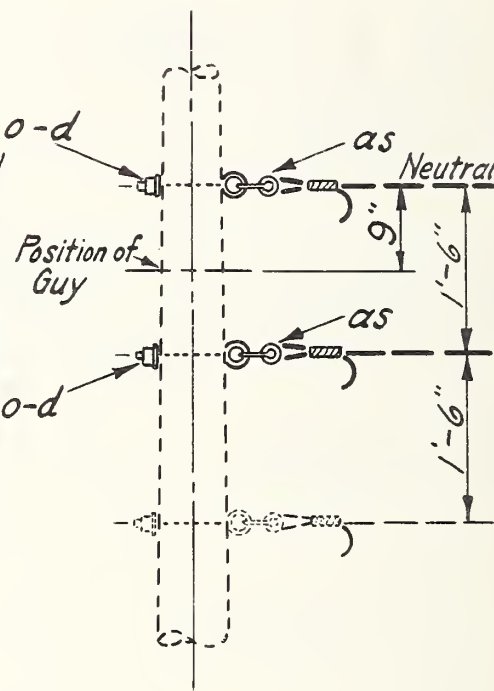
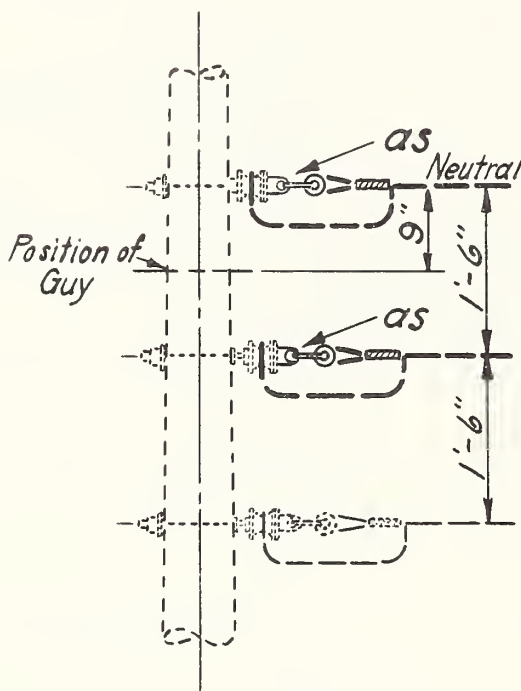
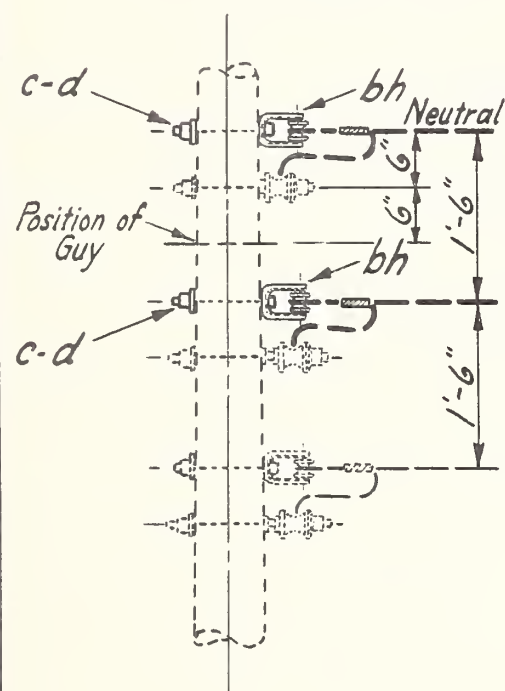
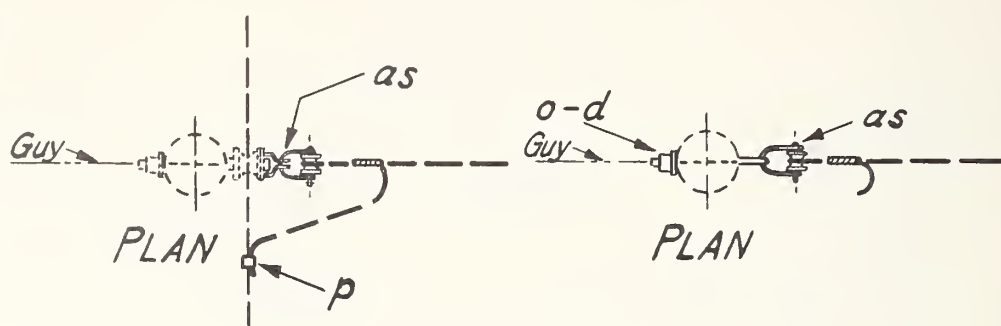
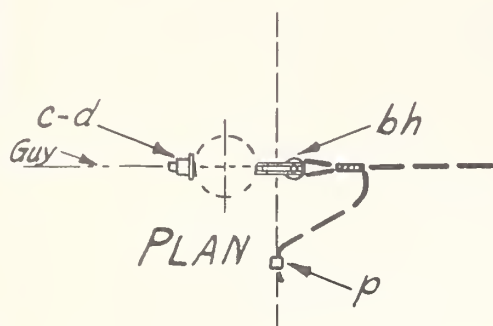
This drawing to be used as a guide
and not for bidding purposes.

In brick or concrete walls use $\frac{3}{8}$ " expansion bolts or shields in $\frac{5}{8}$ " holes at least $2\frac{1}{2}$ " deep, or wedge expanded eye bolts.

CONDUCTOR SPACING
DIMENSIONS
ARE MINIMUM

SPECIAL SERVICE ASSEMBLY GUIDE

1.	Added note.	6/15/48	Scale: $\frac{1}{2}$ " = 1'-0"	Date:
No.	REVISION	Date:		M24-2R



A-ASSEMBLY

B-ASSEMBLY

C-ASSEMBLY

Note:

Insulation on covered conductor that is under strain should not be cut.

ITEM	No. REQ'D.	MATERIAL	ITEM	No. REQ'D.	MATERIAL
c		Bolt, machine, $\frac{5}{8}$ " x req'd. length	as		Clevis, service, swinging, insulated
d		Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole	bh		Clevis, service, deadend, insulated
o		Bolt, eye, $\frac{5}{8}$ " x req'd. length			
p		Connectors, as req'd.			

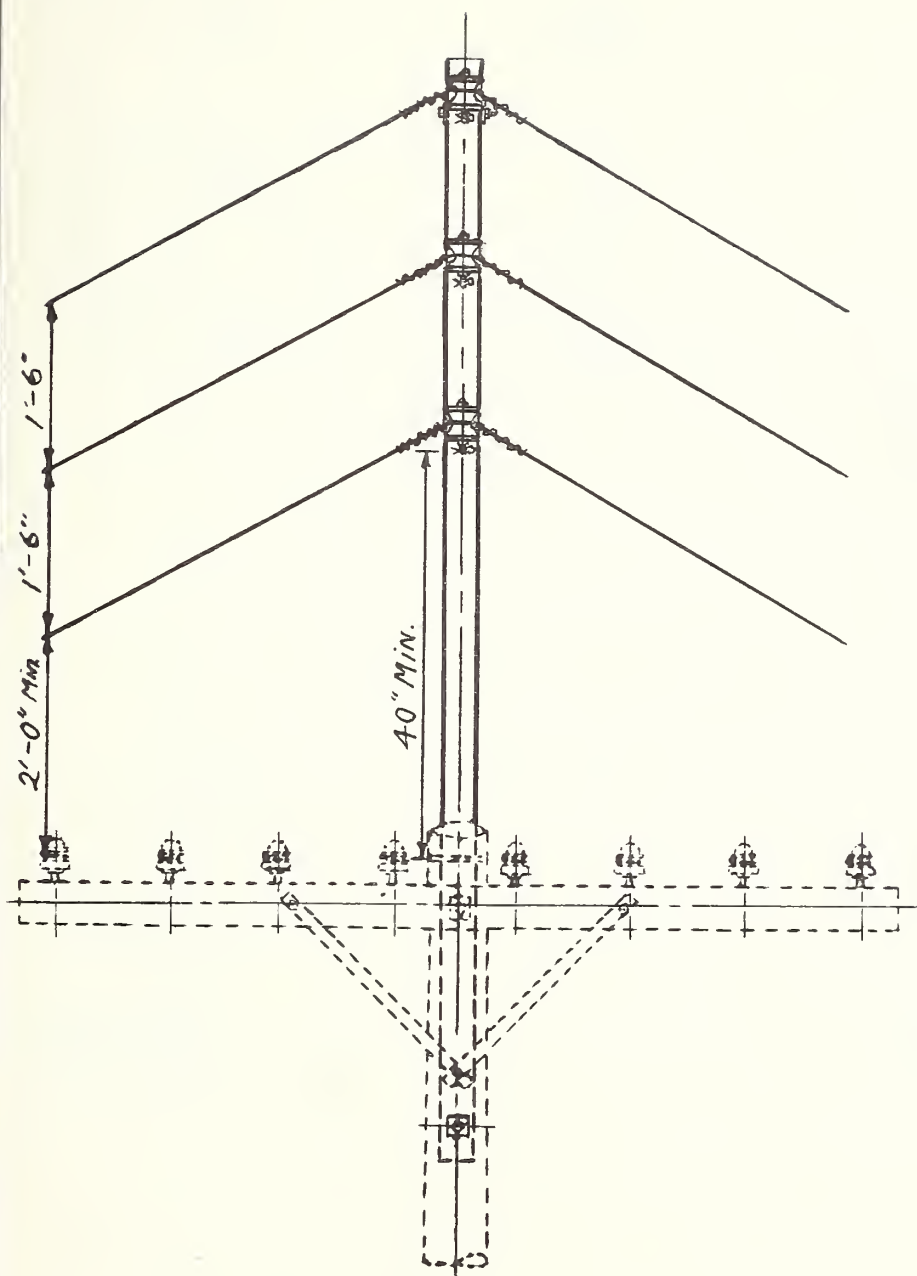
SERVICE ASSEMBLY GUIDE
VERTICAL CONSTRUCTION-TAPS AND DEADENDS

Scale: $\frac{1}{2}$ " = 1'-0"

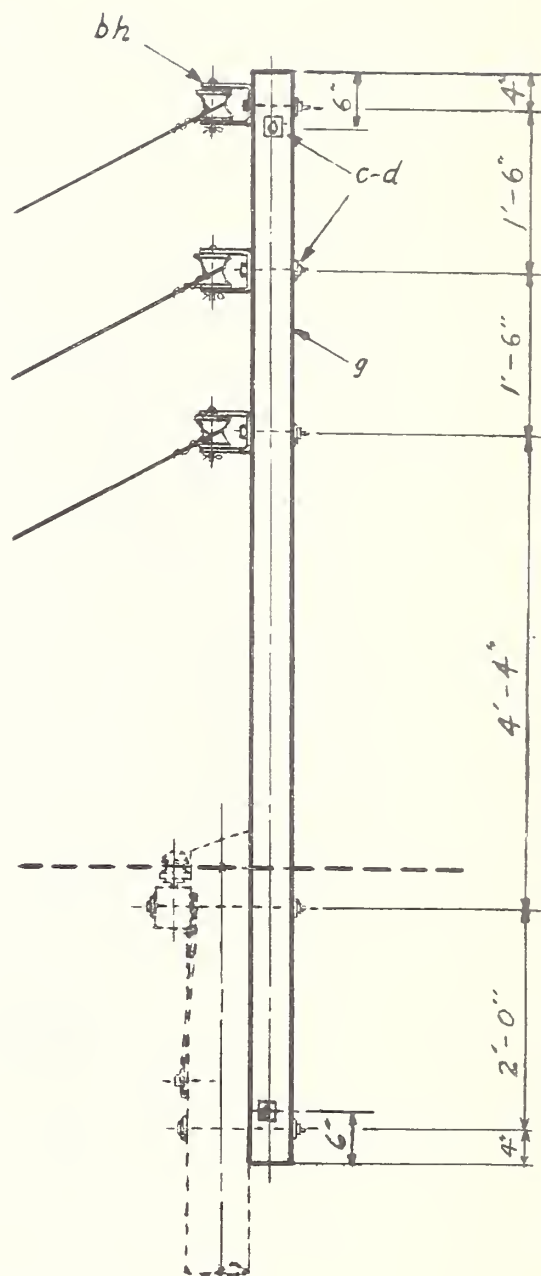
Date:

No. REVISION DATE:

M24-3



ELEVATION



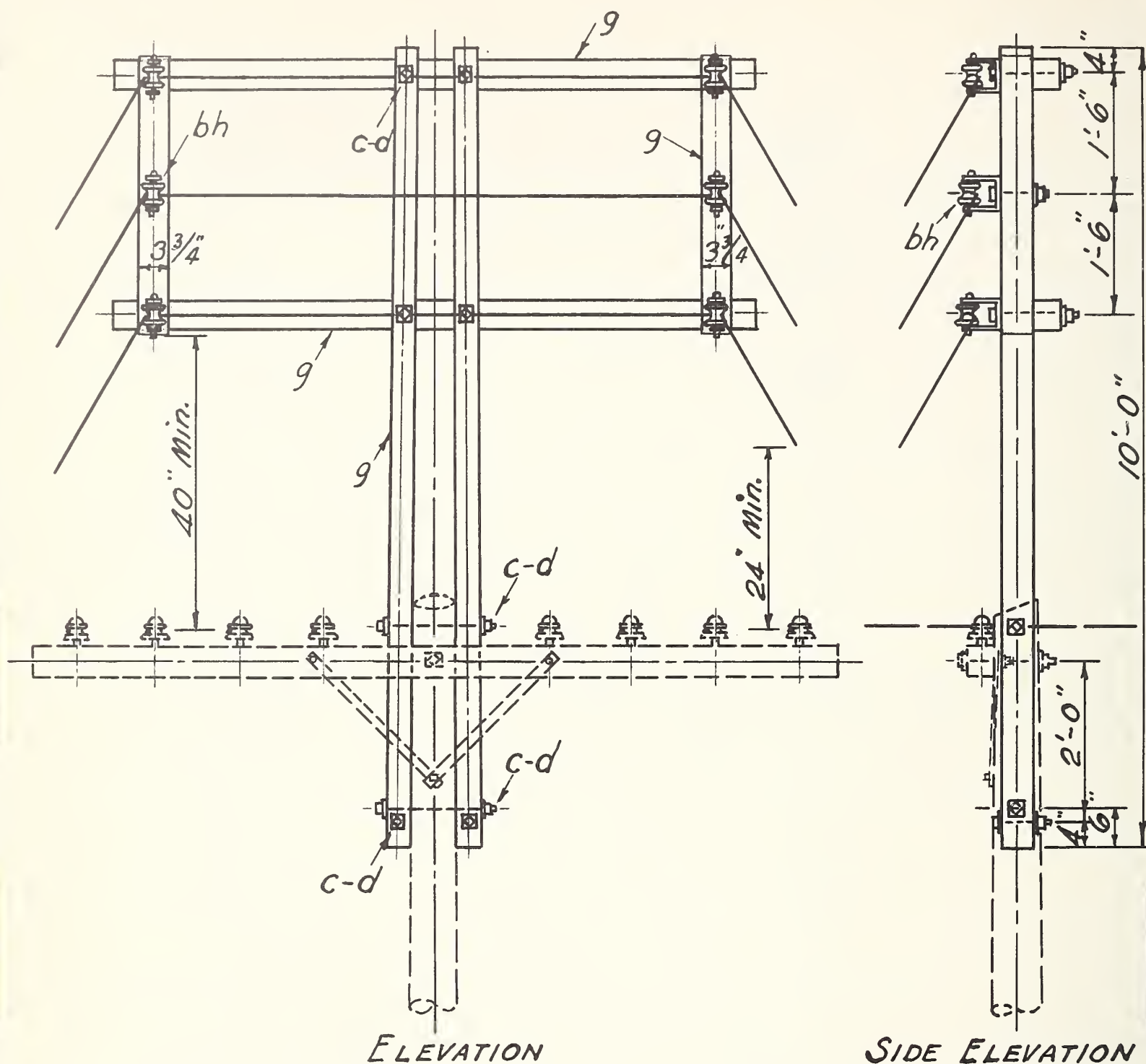
SIDE ELEVATION

ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
c	7	Bolt, machine, $\frac{5}{8}$ " req'd. length	bh	3	Clevis, service, deadend, insulated
d	11	Washer, $2\frac{1}{4}$ " $2\frac{1}{4}$ " $\frac{3}{16}$ " $\frac{13}{16}$ " hole			
g	1	Crossarm, $3\frac{3}{4}$ " $4\frac{3}{4}$ " $10'-0"$			

CONDUCTOR SEPARATIONS
DIMENSIONS
ARE MINIMUM

SPECIAL SERVICE ASSEMBLY GUIDE

1	Minor changes	11/10/48	Scale: $\frac{1}{2}$ " = 1'-0"	Date:
No.	REVISION	DATE		M 24-4R

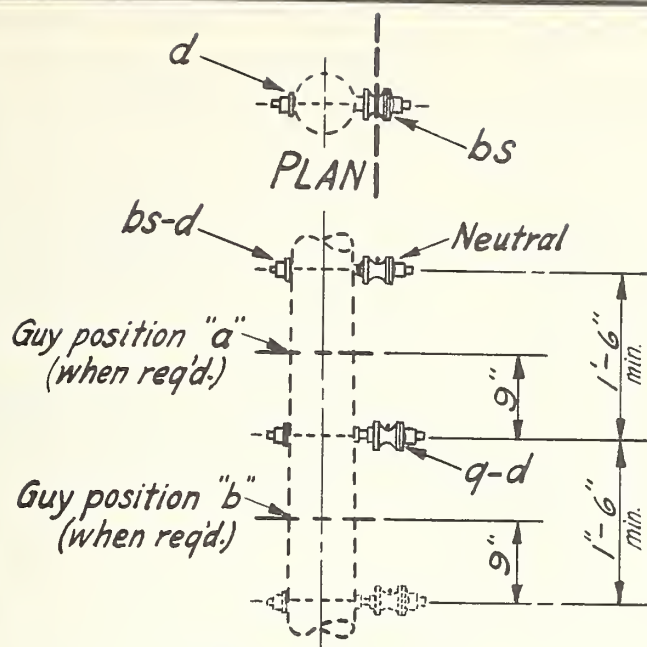


This assembly should be used only where assembly shown on M24-4 will not provide at least a 24 inch clearance between the supply service wires and the communication conductor on the end pin.

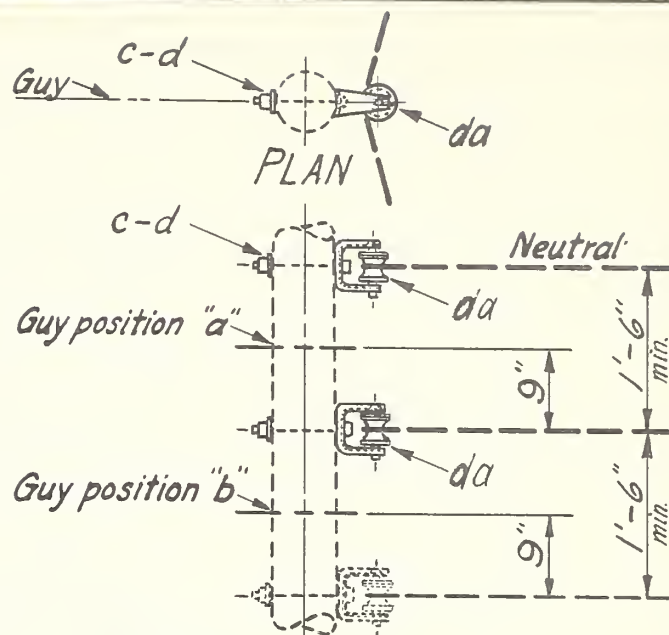
ITEM	No. REQD.	MATERIAL	ITEM	No. REQD.	MATERIAL
C	14	Bolt machine, 5/8" x req'd. lgth.	9	2	Crossarms, 3 1/2" x 4 1/2" x 8'-0"
d	22	Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	9	2	Crossarms, 3 3/4" x 4 3/4" x 10'-0"
g	2	Crossarms, 3 3/4" x 4 3/4" x 3'-6"	bh	6	Clevis service deadend insulator

SPECIAL SERVICE ASSEMBLY GUIDE

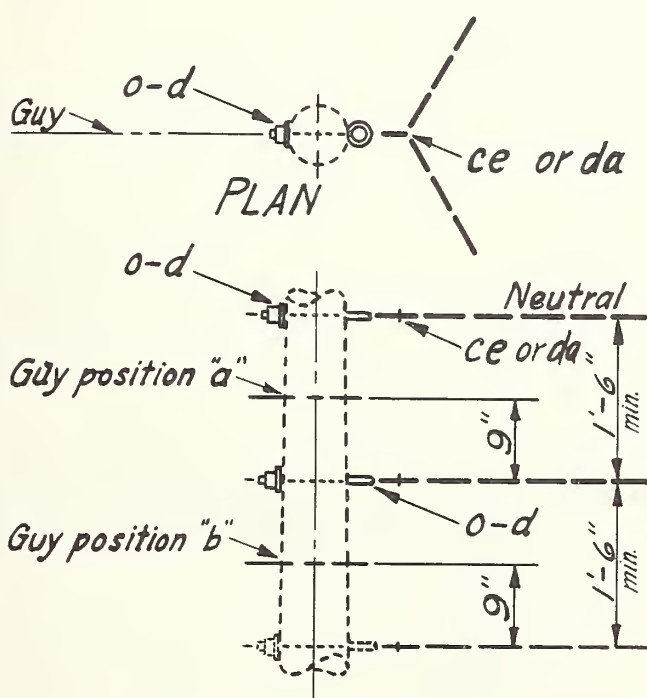
1	Minor changes	11/10/48	Scale: 1/2"=1'-0"	Date:
No.	REVISION	DATE		M24-5R



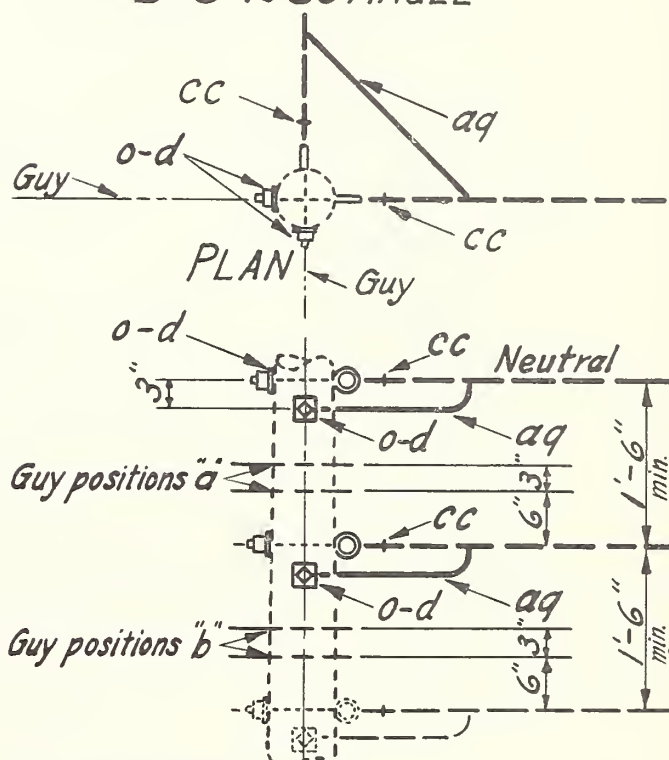
A-0° TO 5° ANGLE



B-5° TO 30° ANGLE



C-30° TO 60° ANGLE



D-60° TO 90° ANGLE

NOTES: Guy position "a" for poles having secondary conductors only.

Guy position "b" for poles having primary and secondary conductors (underbuilt).

ITEM	No. REQD	MATERIAL	ITEM	No. REQD	MATERIAL
c		Bolt, machine, $\frac{5}{8}$ " x req'd. length	aq		Jumpers
d		Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{1}{8}$ " hole	bs		Bolt, single upset, insulated
o		Bolt, eye, $\frac{5}{8}$ " x req'd. length	cc		Deadend assembly, neutral and secondary
p		Connectors, as req'd.	ce		Angle assembly, neutral and secondary
q		Bolt, double upset, insulated	da		Bracket, insulated

CONDUCTOR SEPARATIONS
DIMENSIONS
ARE MINIMUM

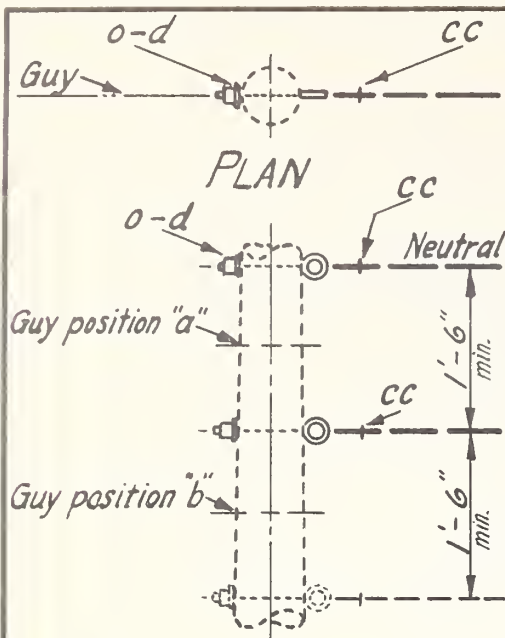
-----V SECONDARY ASSEMBLY GUIDE
VERTICAL CONSTRUCTION-0° TO 90° ANGLE

Scale: $\frac{1}{2}$ " = 1'-0"

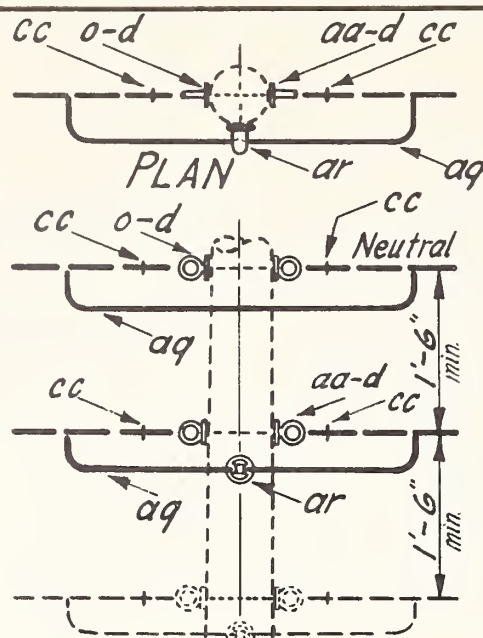
Date:

1	Changed neutral support	11/15/48
No	REVISION	DATE

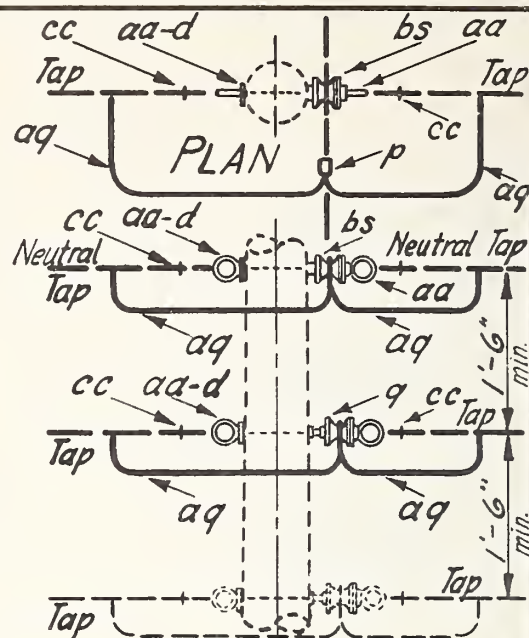
M25-1R



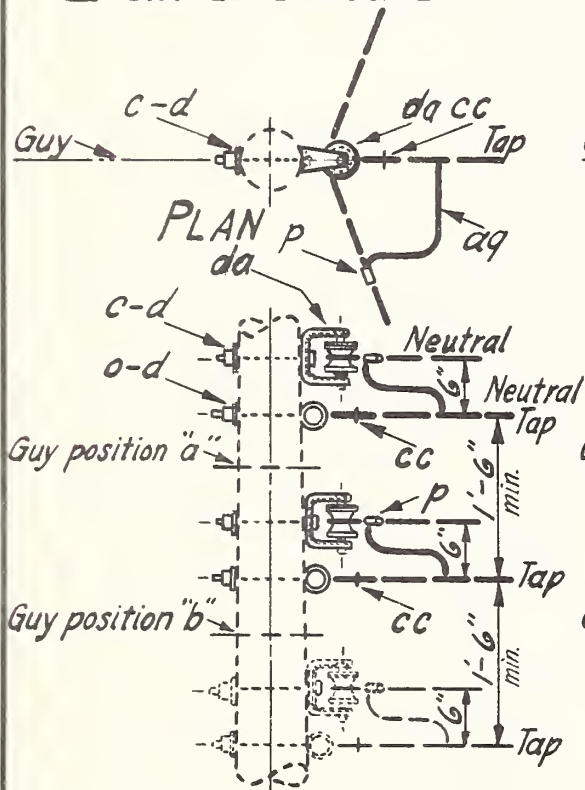
E-SINGLE DEADEND



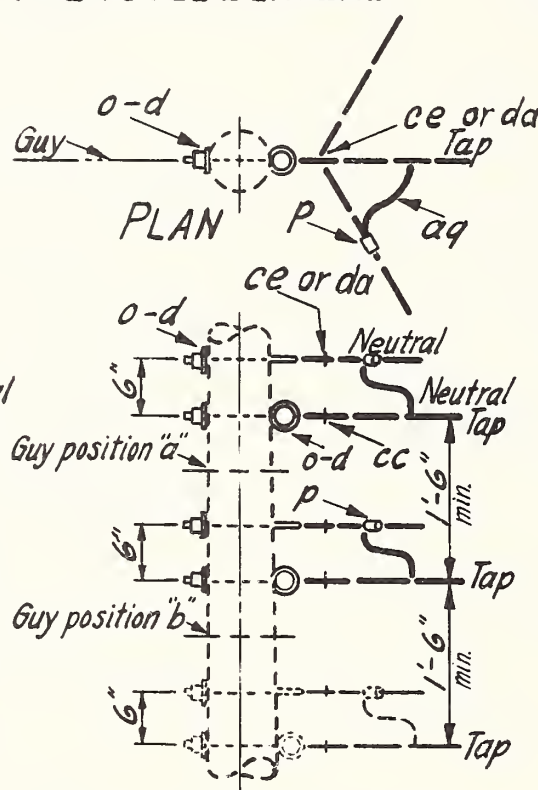
F-DOUBLE DEADEND



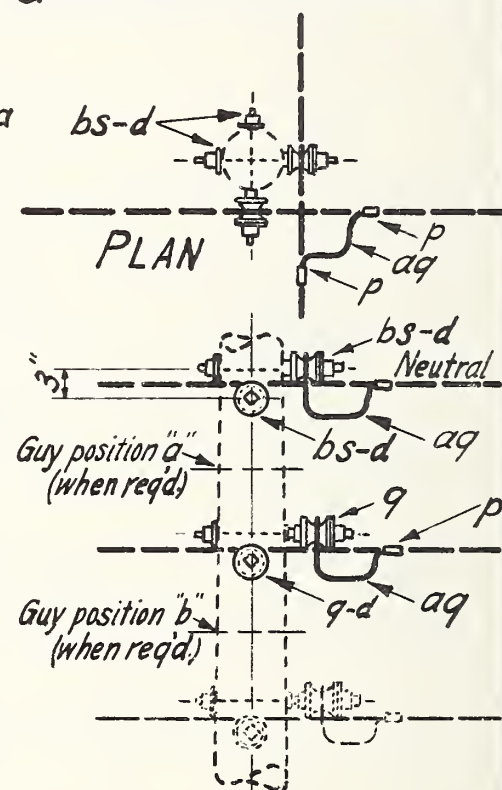
G-TAPS AT 0° TO 5° ANGLE



H-TAP AT 5° TO 30° ANGLE



I-TAP AT 30° TO 60° ANGLE



J-JUNCTION

NOTES: Guy position "a" for poles having secondary conductors only.

Guy position "b" for poles having primary and secondary conductors (underbuilt).

ITEM	N ^o REQD	MATERIAL	ITEM	N ^o REQD	MATERIAL
d		Washer, 2 1/4" x 2 1/4" x 3/16", 1 3/16" hole	aq		Jumpers
o		Bolt, eye, 5/8" x req'd. length	ar		Wireholder
p		Connectors, as req'd.	bs		Bolt, single upset, insulated
q		Bolt, double upset, insulated	cc		Deadend assembly, neutral and secondary
da		Bracket, insulated	ce		Angle assembly, neutral and secondary
aa		Nut, eye, 5/8"	c		Bolt, machine, 5/8" x req'd. length

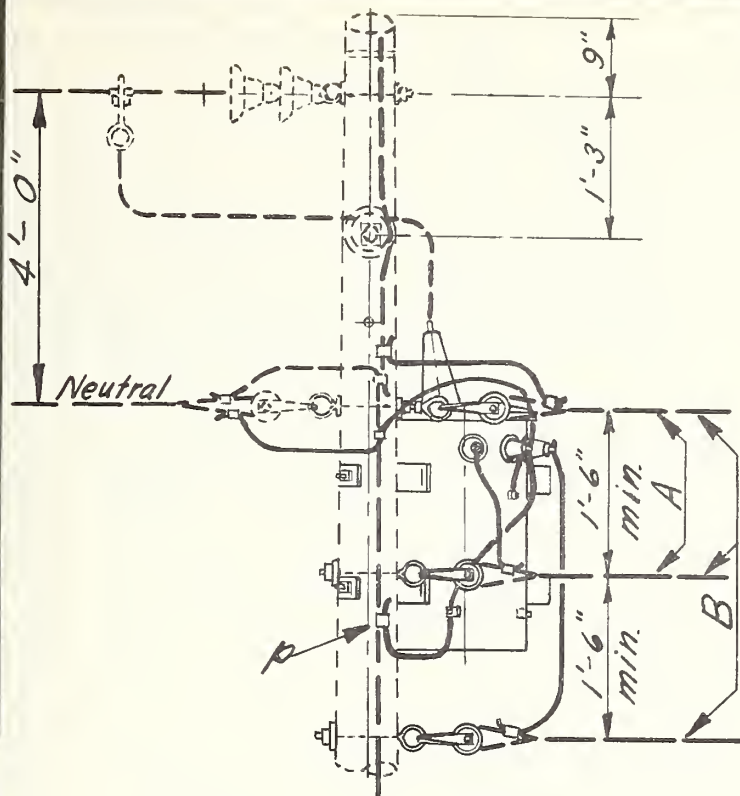
V. SECONDARY ASSEMBLY GUIDE
VERTICAL CONSTRUCTION-DEADENDS, TAPS AND JUNCTIONS

Scale: 1/2" = 1'-0"

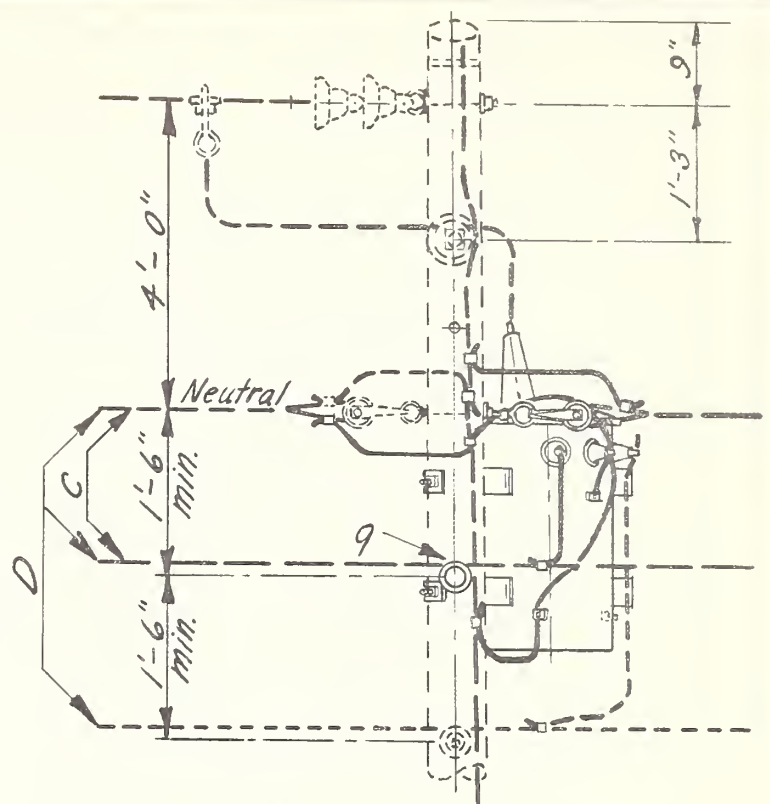
Date:

1	Changed neutral support	11/15/48
N ^o	REVISION	DATE

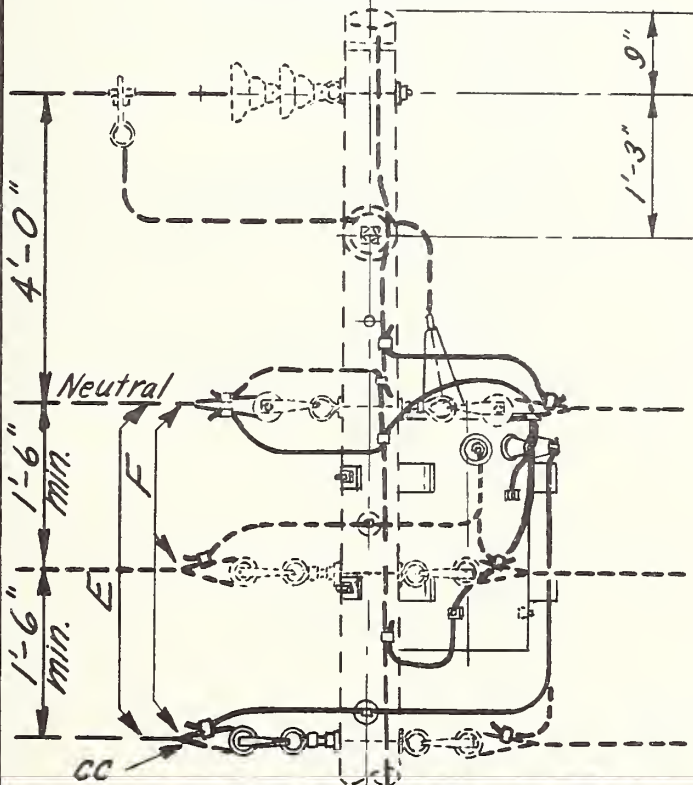
M25-2R



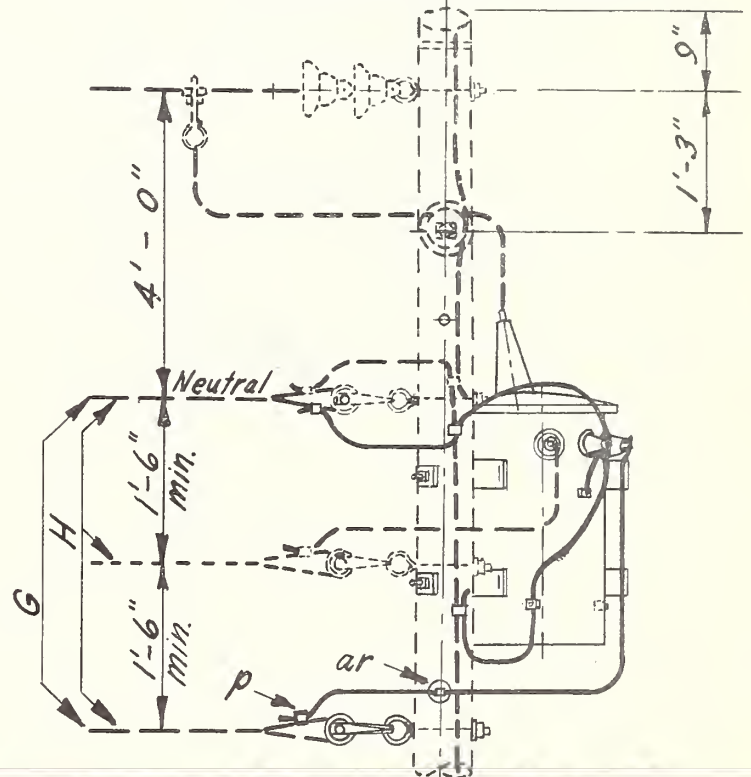
ASSEMBLIES A AND B



ASSEMBLIES C AND D



ASSEMBLIES E AND F



ASSEMBLIES G AND H

ITEM	No REQ'D	MATERIAL	ITEM	No REQ'D	MATERIAL
d		Washer, 2 1/4" x 2 1/4" x 3/16", 13/16" hole	aa		Nut, eye, 5/8"
k		Insulator, suspension	ar		Wireholder
o		Bolt, eye, 5/8" x req'd length.	cc		Deadend assembly, secondary
p		Connectors, as req'd			
q		Bolt, double upset, insulated			

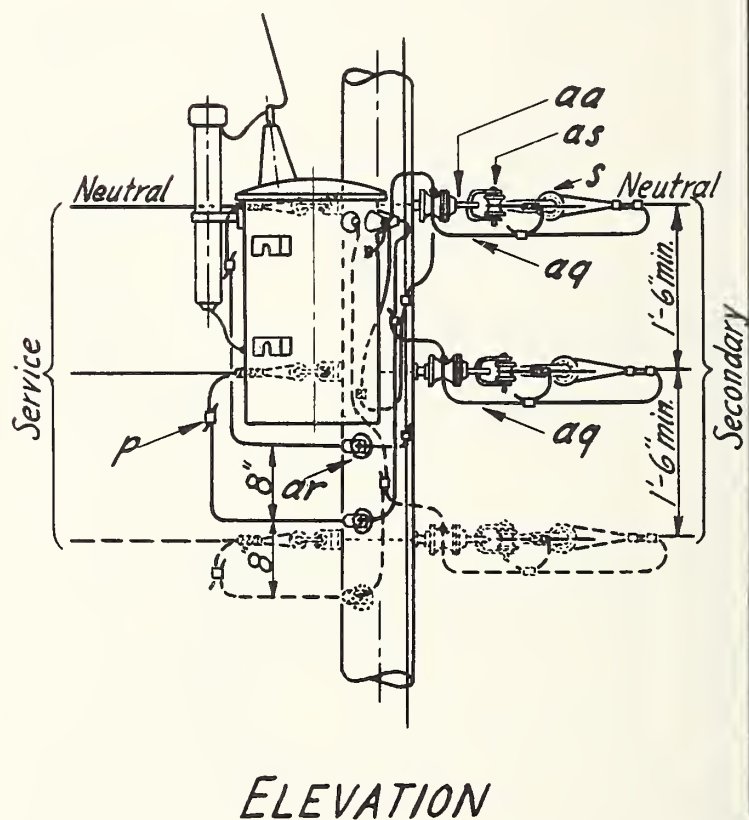
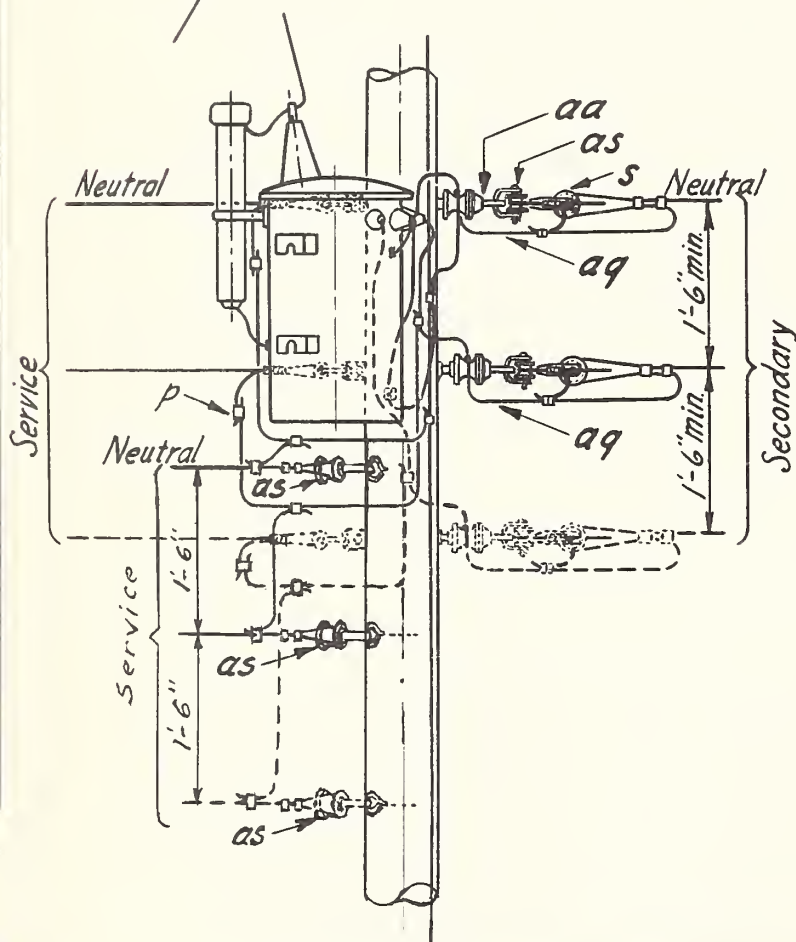
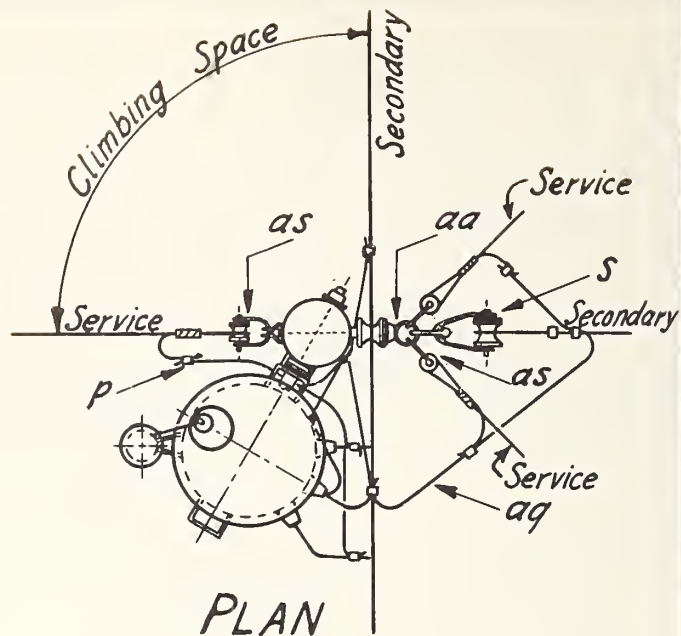
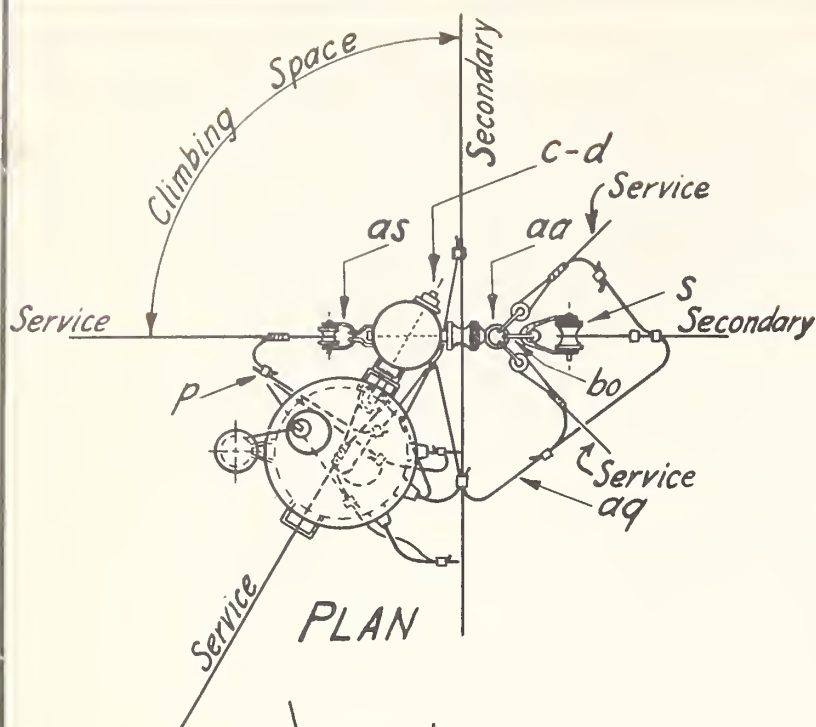
SECONDARY TAKE-OFF GUIDE
FOR TRANSFORMER AT DEADEND

Scale: 1/2" = 1'-0"

Date: June 11, 1948

No REVISION DATE

M26-1R



ITEM	No. REQD	MATERIAL	ITEM	No. REQD	MATERIAL
c		Bolt, machine, $\frac{5}{8}$ " x req'd. length	aq		Jumpers
d		Washer, $2\frac{1}{4}$ " x $2\frac{1}{4}$ " x $\frac{3}{16}$ ", $\frac{13}{16}$ " hole.	ar		Wireholder
p		Connectors, as req'd.	as		Clevis, service, swinging, insulated
s		Clevis, secondary, swinging, insulated	bo		Shackle, anchor
aa		Nut, eye, $\frac{5}{8}$ "			

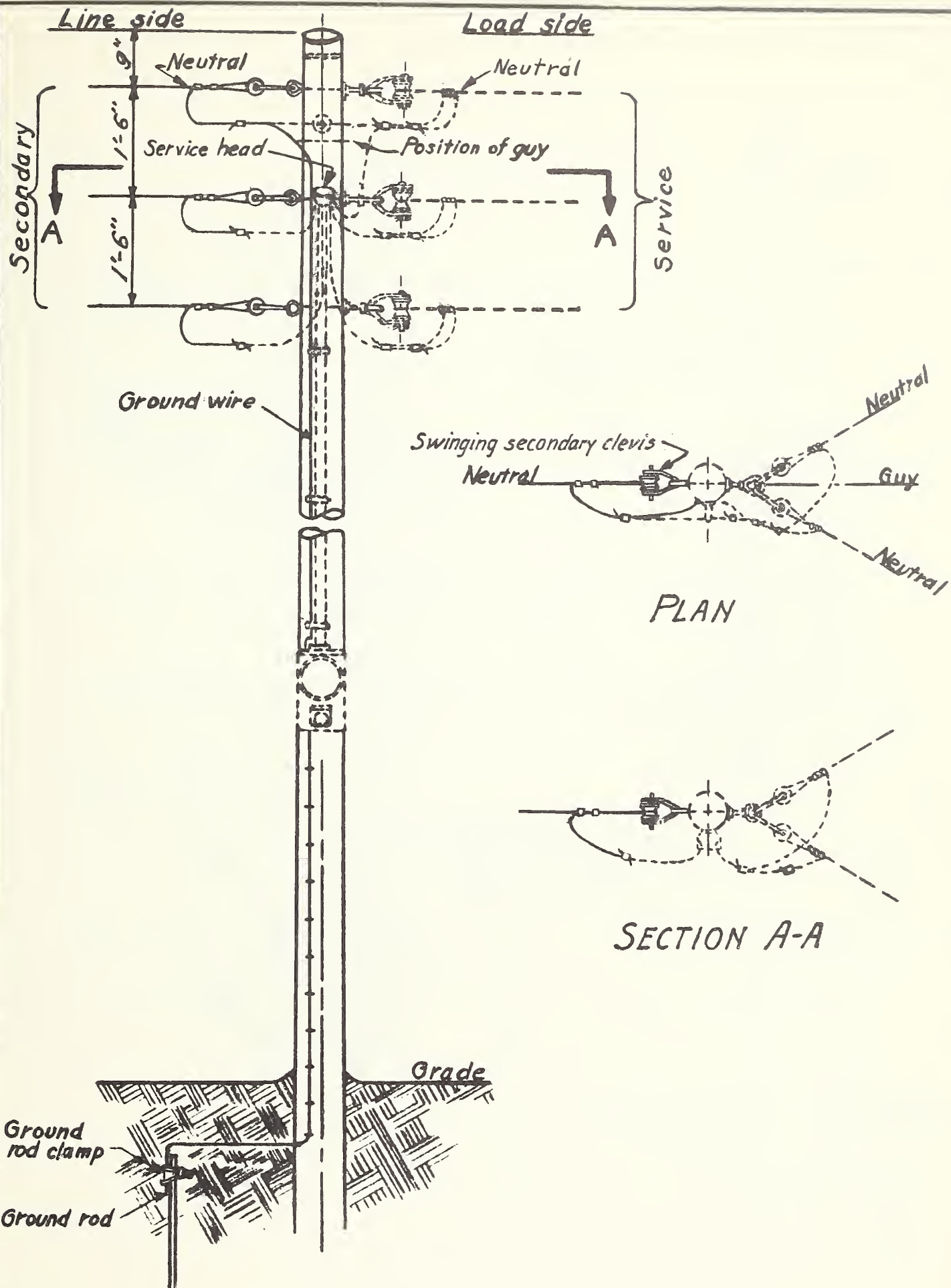
TAKE-OFF GUIDE
FOR SECONDARIES AND SERVICES AT TRANSFORMER, 0° TO 5° ANGLE

Scale: $\frac{1}{2}$ " = 1'-0"

Date:

No. REVISION DATE

M26-2



CONDUCTOR SEPARATIONS
DIMENSIONS
ARE MINIMUM

YARD POLE CONNECTION GUIDE WITHOUT TRANSFORMER

Scale $\frac{1}{2}'' = 1'-0''$

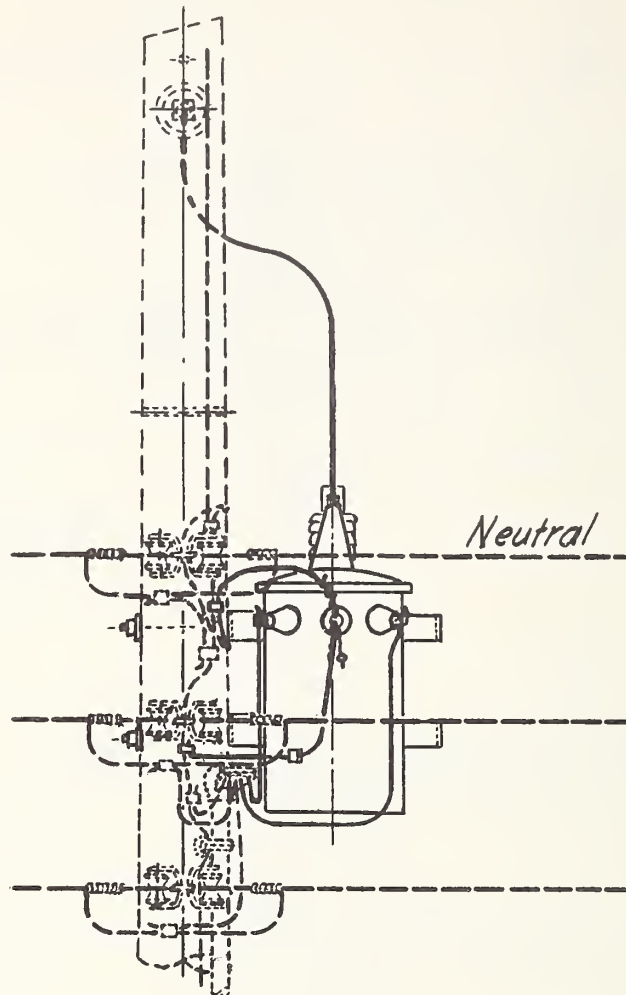
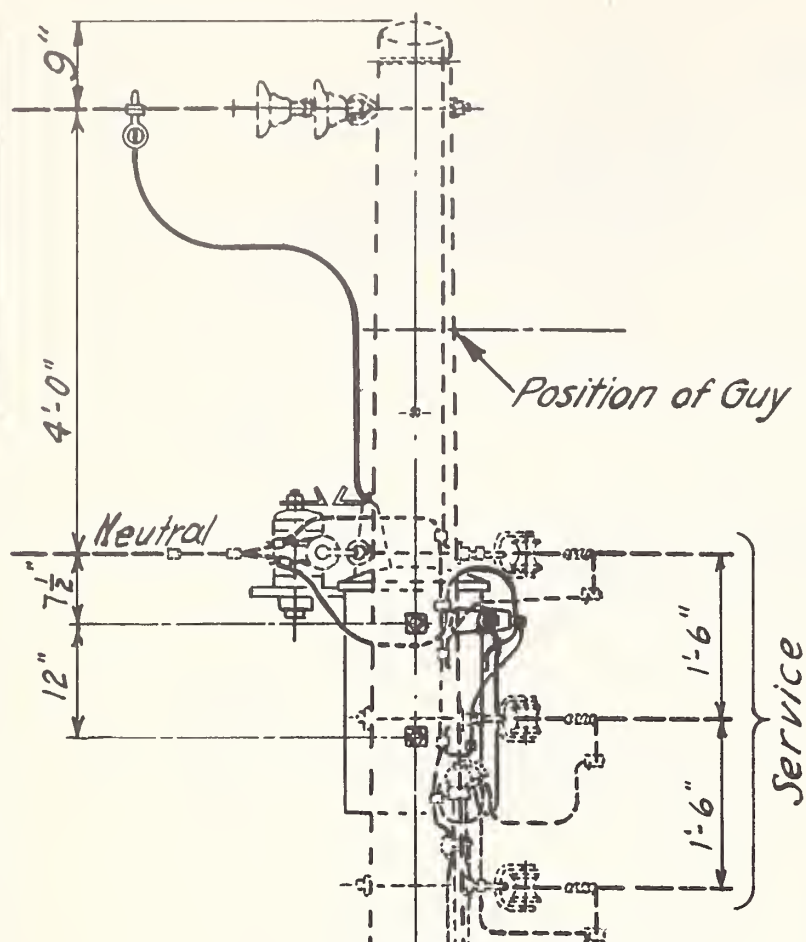
Date:

M26-3

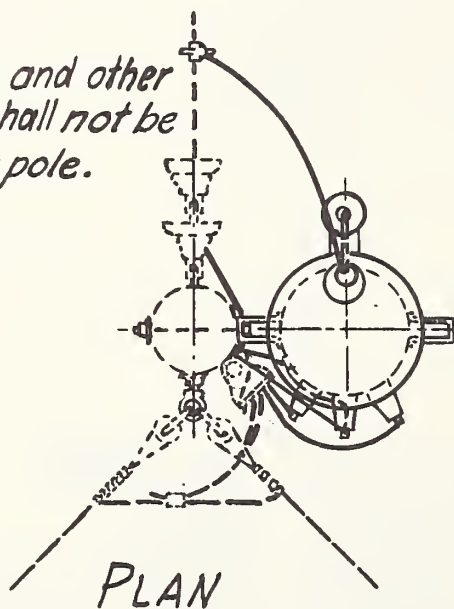
No.

REVISION

DATE



Yard lights and other attachments shall not be located on this pole.



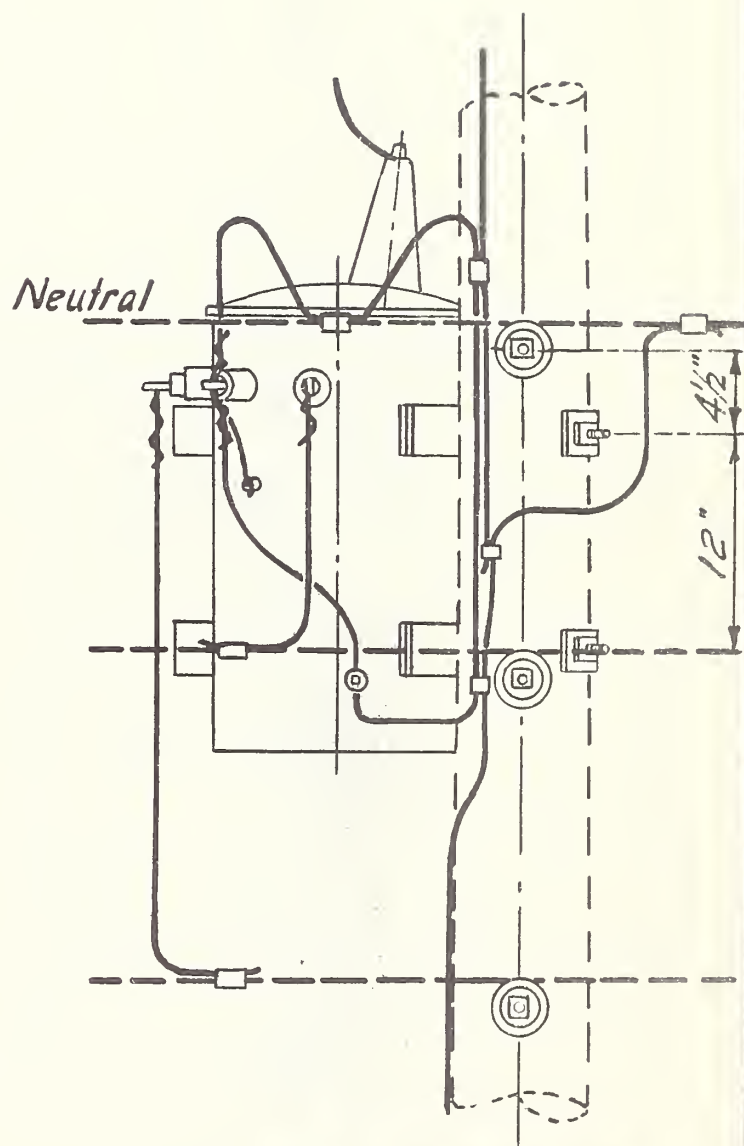
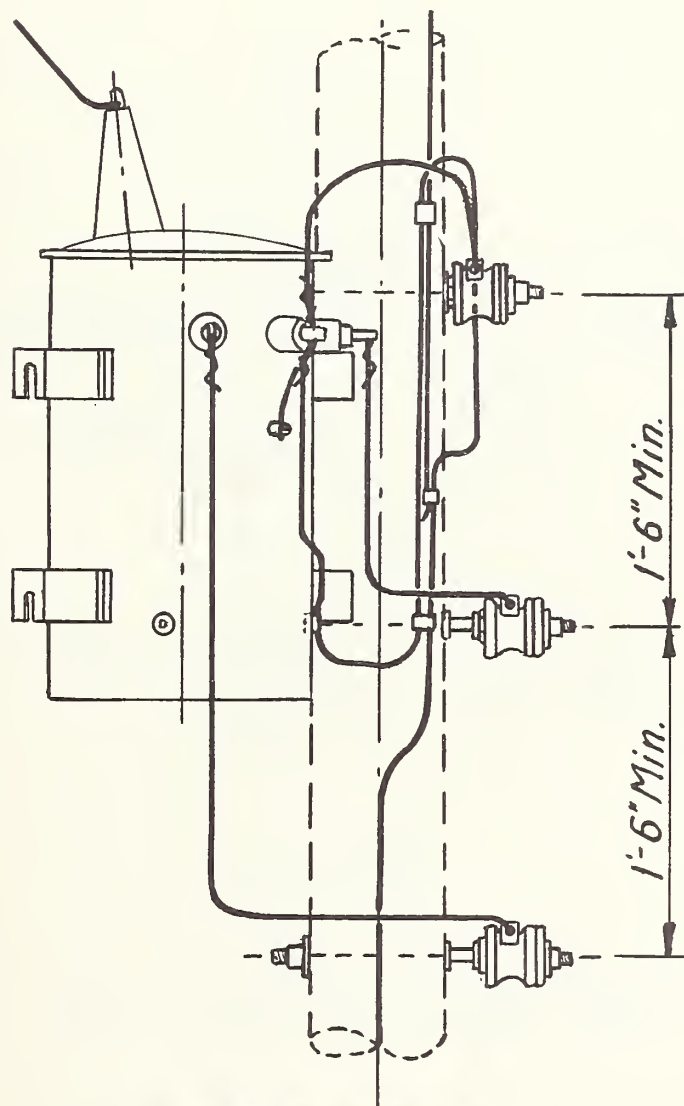
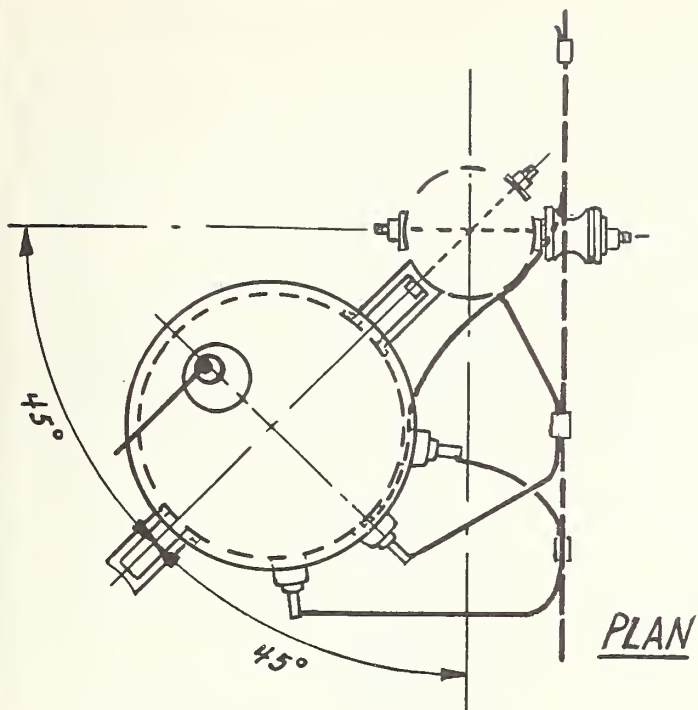
YARD POLE CONNECTION GUIDE WITH TRANSFORMER

Scale: 1/2" = 1'-0"

Date: July 1, 1948

No. REVISION DATE

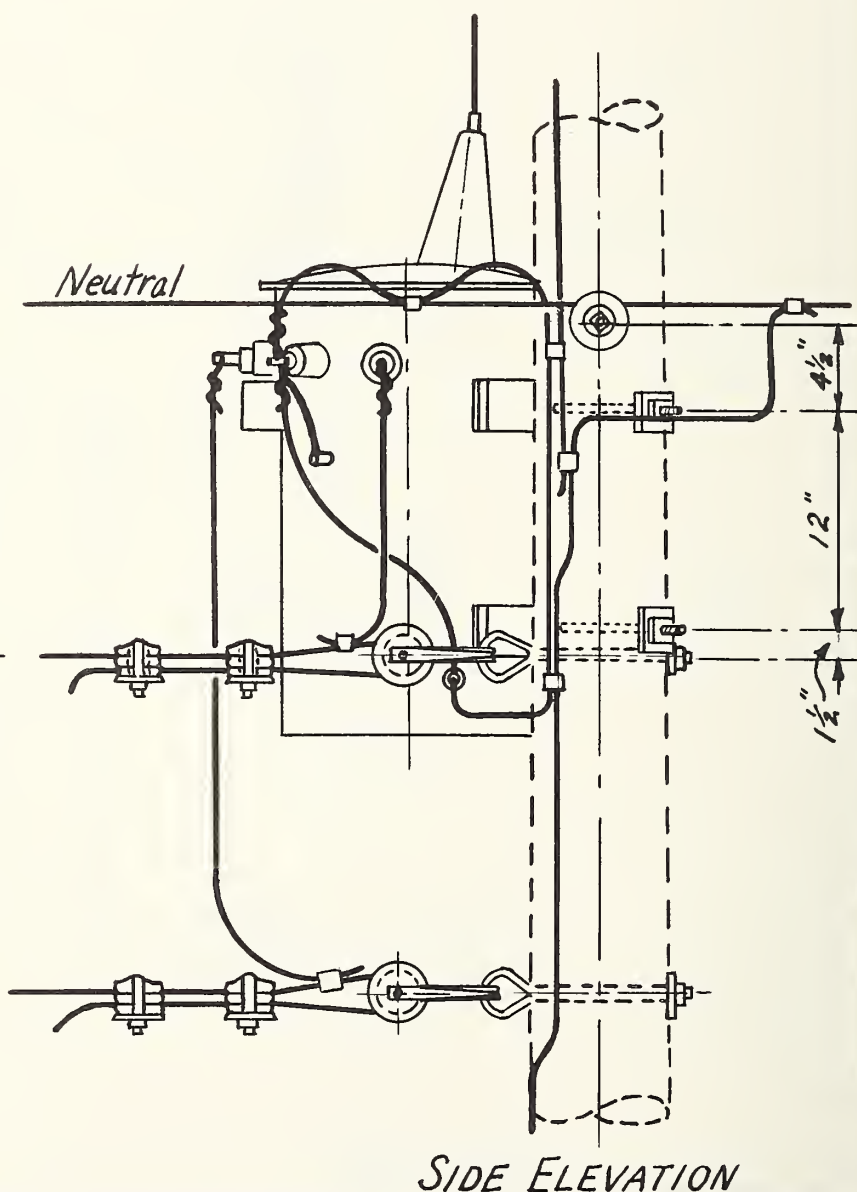
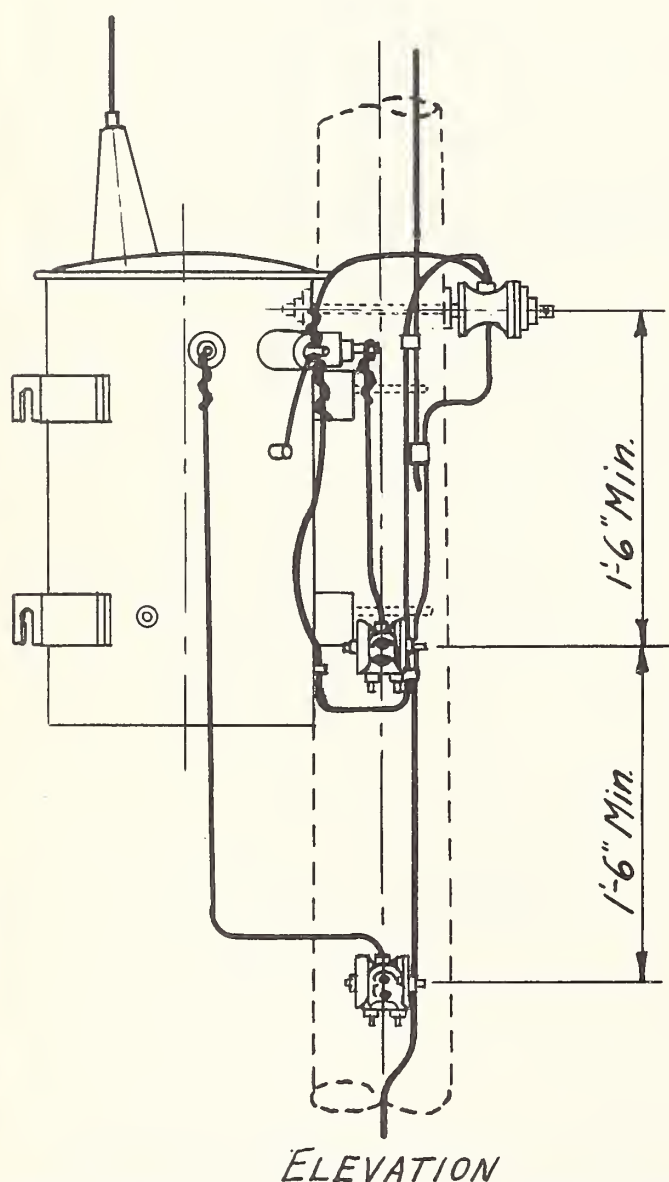
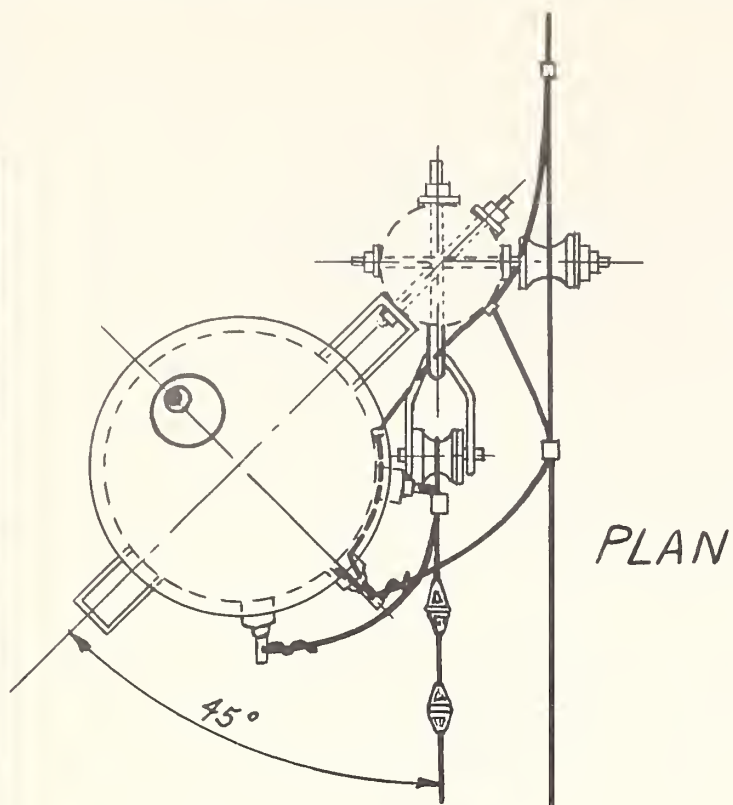
M26-4R



CONDUCTOR SEPARATIONS
DIMENSIONS
ARE MINIMUM

SECONDARY CONNECTION GUIDE FOR TRANSFORMERS AT 0° TO 5° ANGLE

1	Minor changes	11/15/48	Scale: 1"=1'-0"	Date:
No	REVISION	DATE		M27-1R



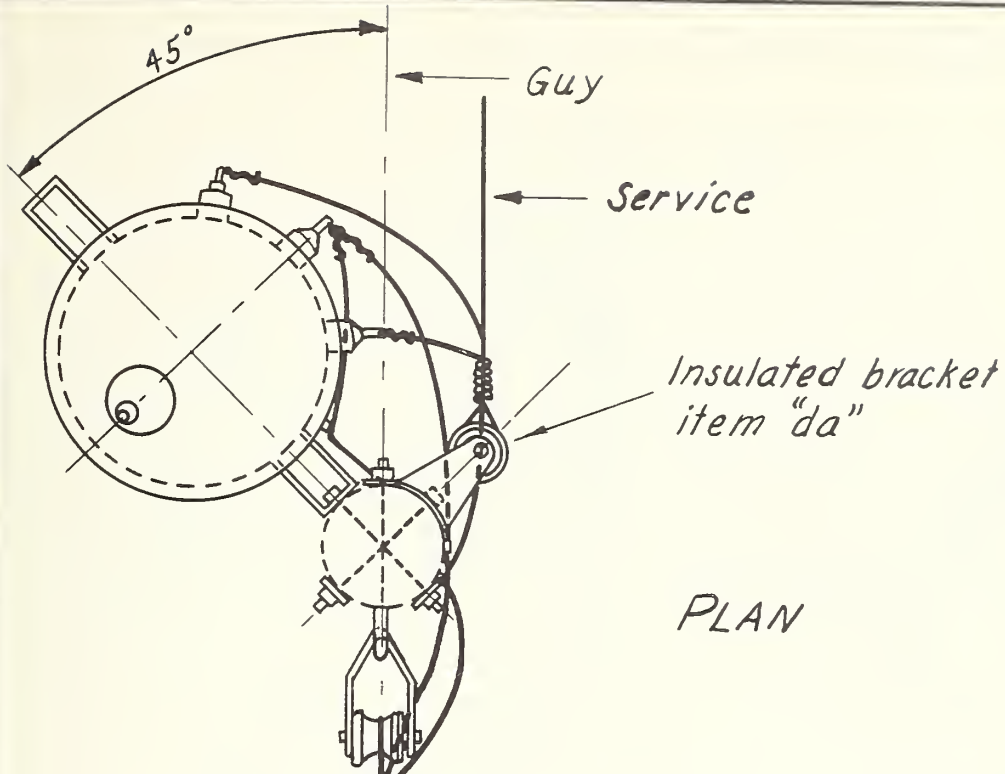
SECONDARY CONNECTION GUIDE FOR TRANSFORMERS AT SECONDARY DEADEND

Scale: 1" = 1'-0"

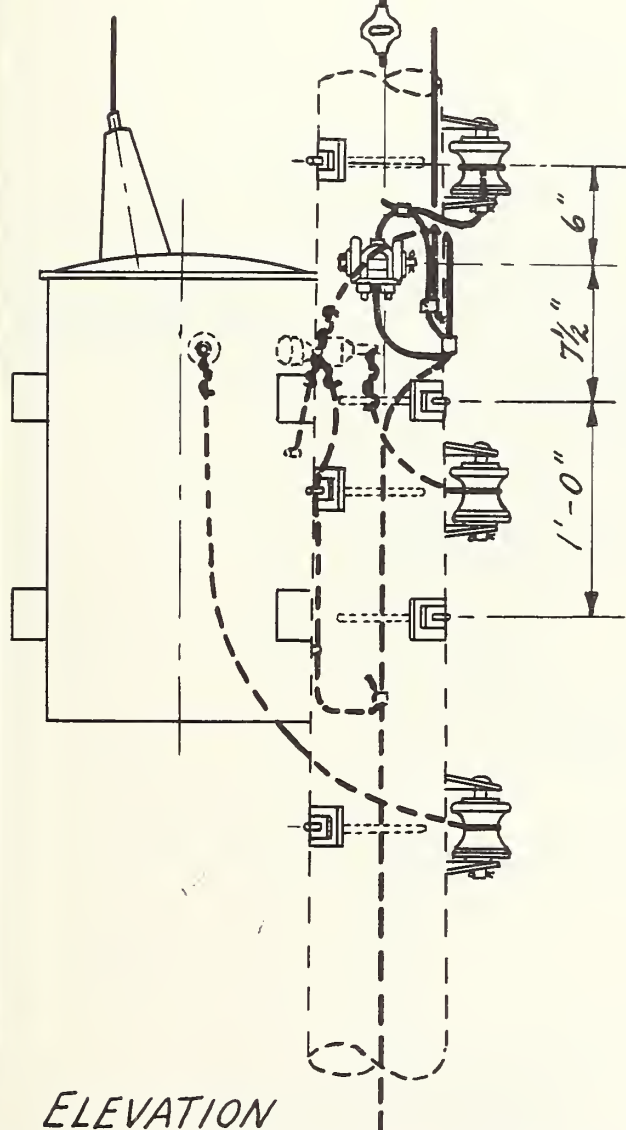
Date: 6-15-48

No	REVISION	DATE

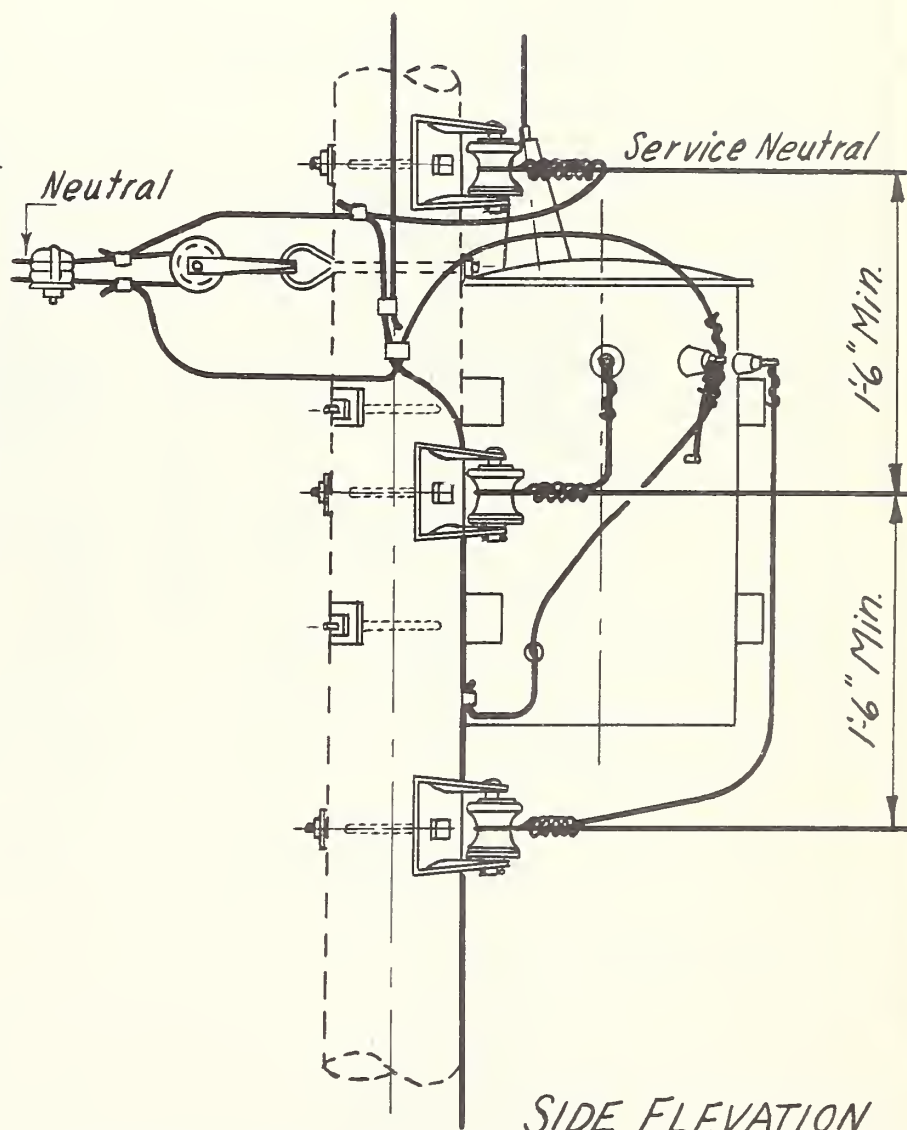
M27-2R



PLAN



ELEVATION



SIDE ELEVATION

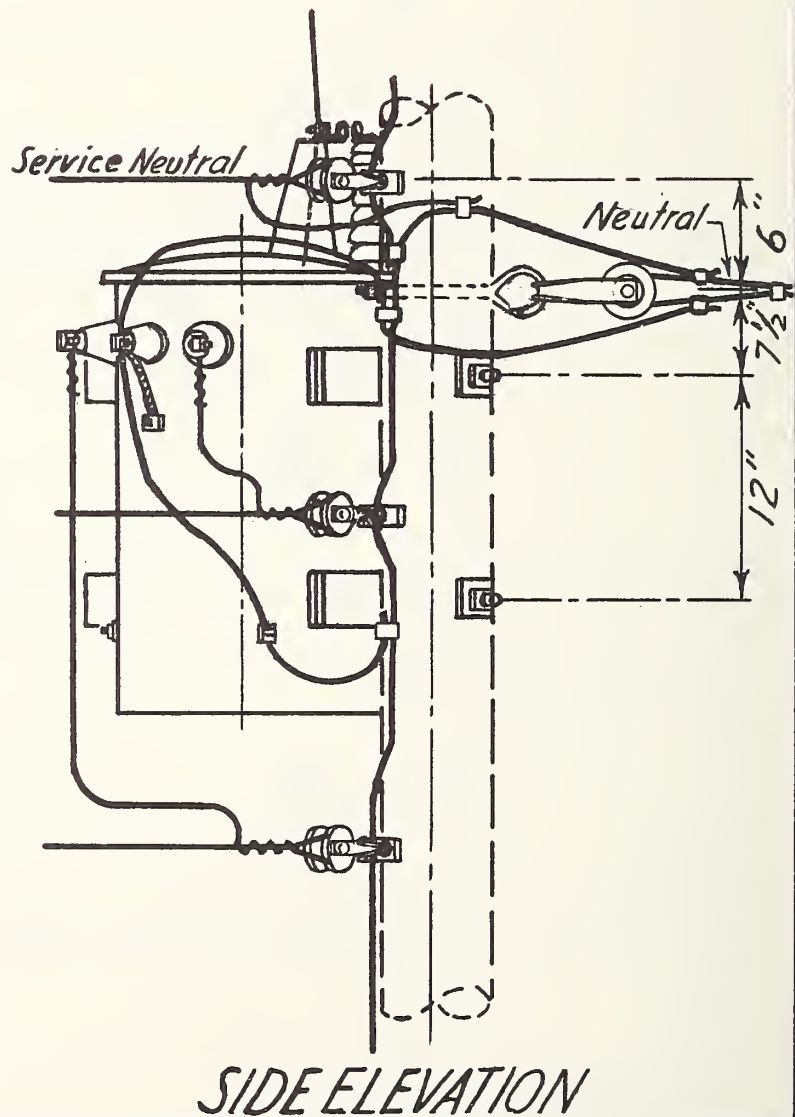
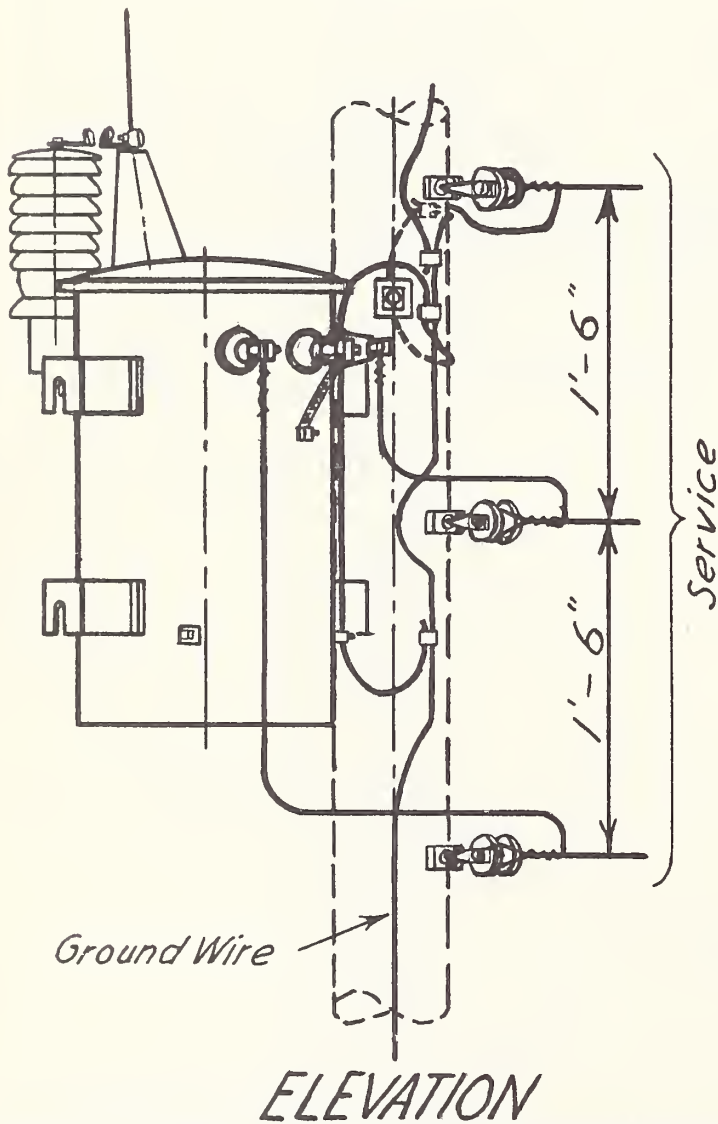
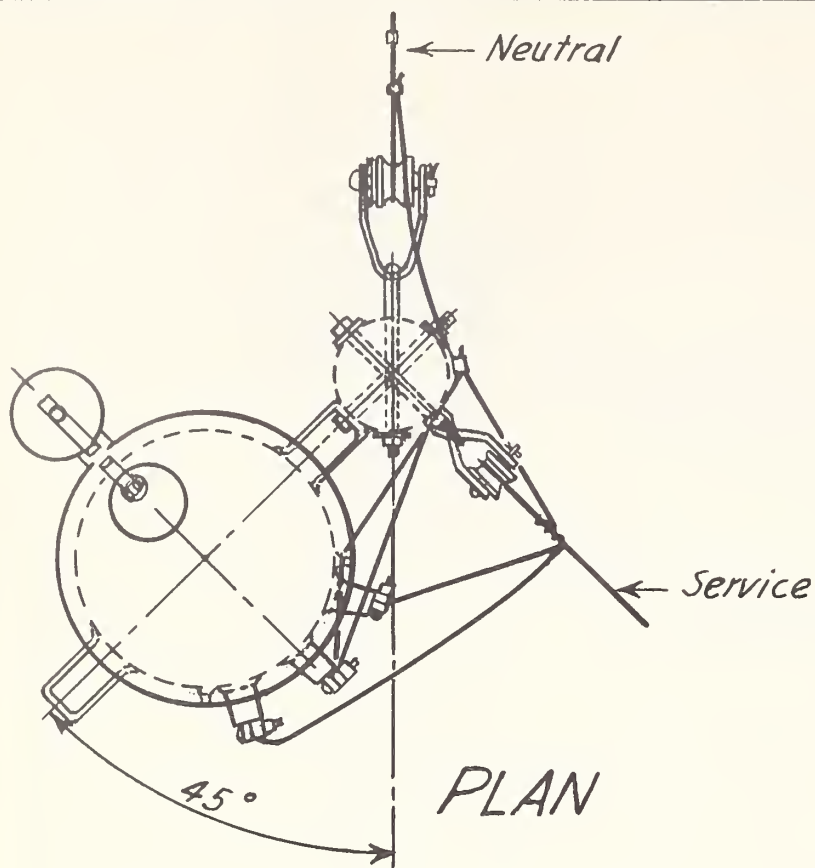
SERVICE CONNECTION GUIDE FOR TRANSFORMER AT DEADEND

Scale: 1"=1'-0"

Date: June 17, 1948

No	REVISION	DATE
----	----------	------

M27-3



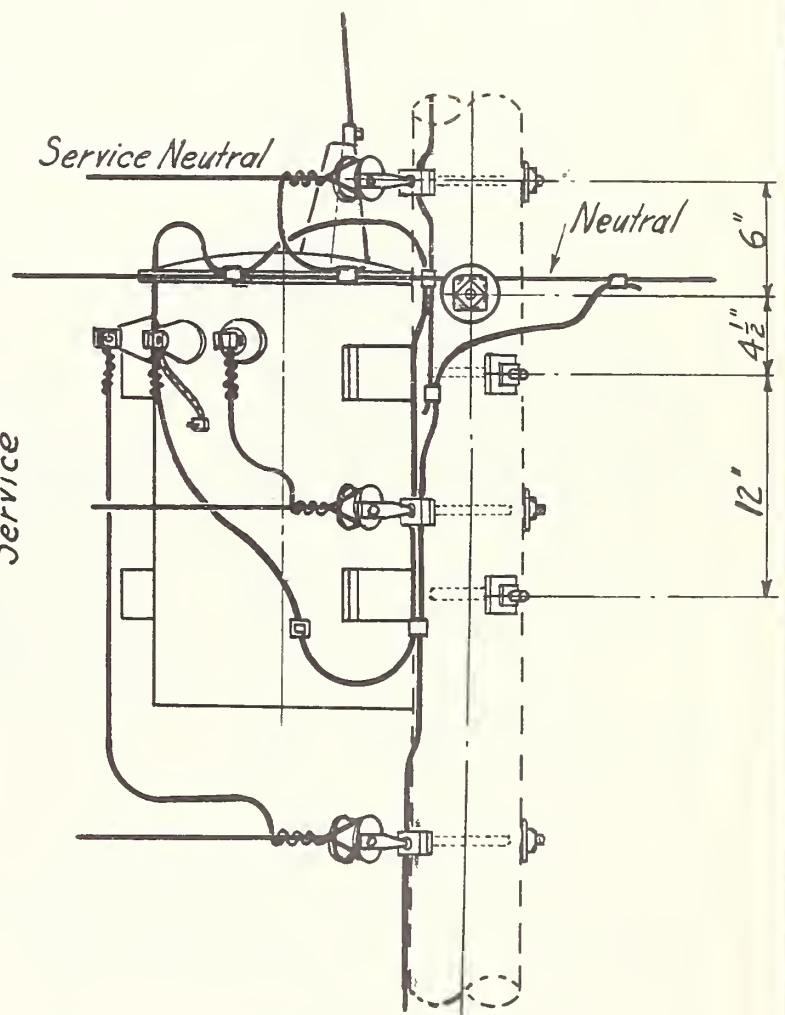
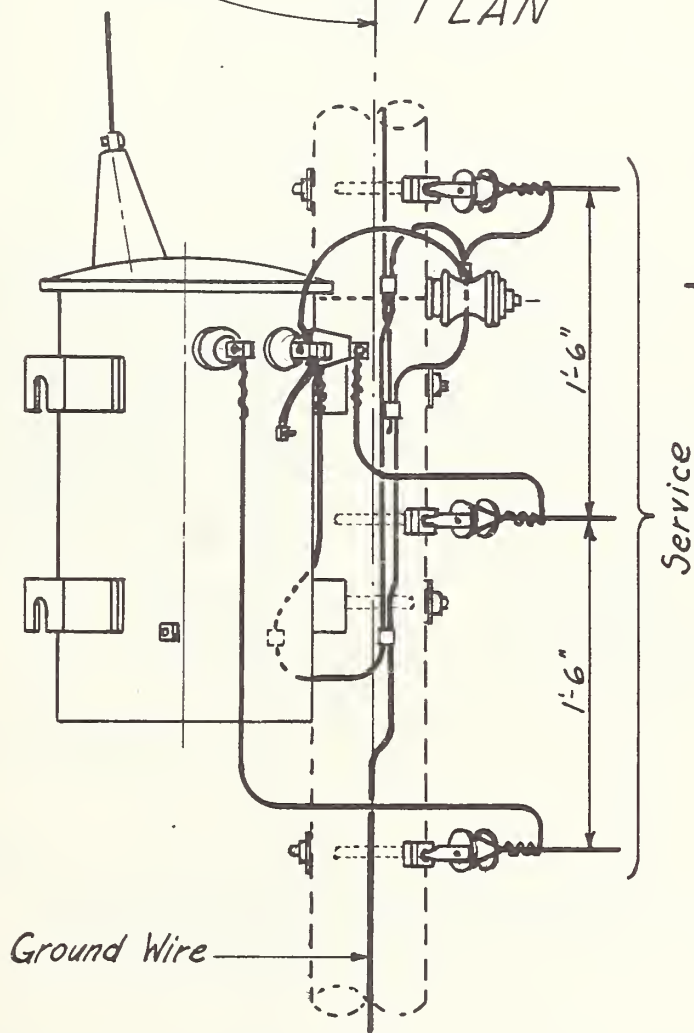
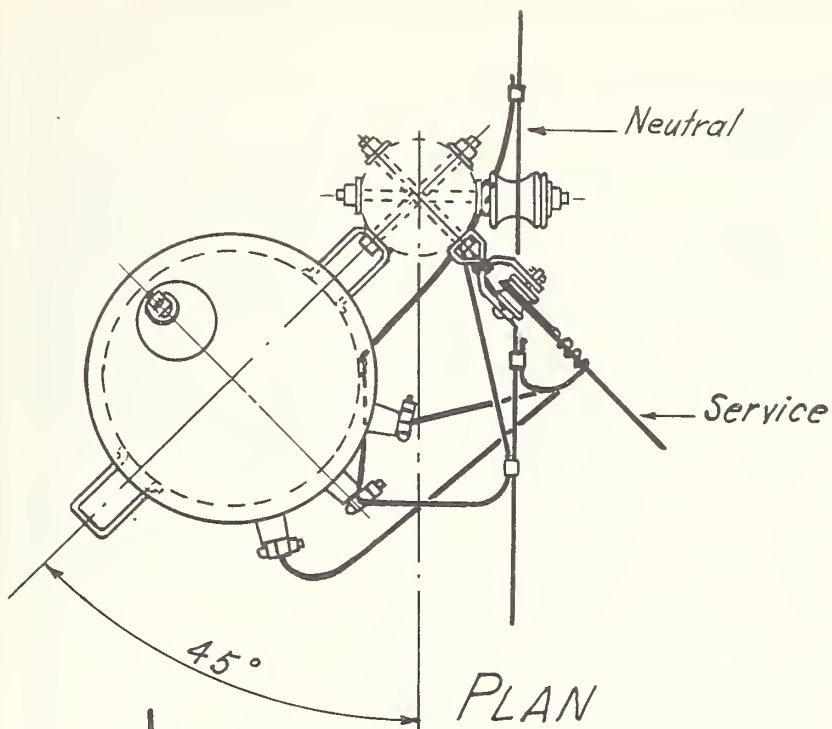
SERVICE OR SECONDARY CONNECTION GUIDE
SELF PROTECTED TRANSFORMER AT DEADEND

Scale: 1"=1'-0"

Date: Mar. 17, 1948

1	Redrawn	11/15/48
No	REVISION	DATE

M 28R



SERVICE OR SECONDARY CONNECTION GUIDE
CONVENTIONAL TRANSFORMER

Scale: 1"=1'-0"

Date: June 8, 1948

1 Redrawn

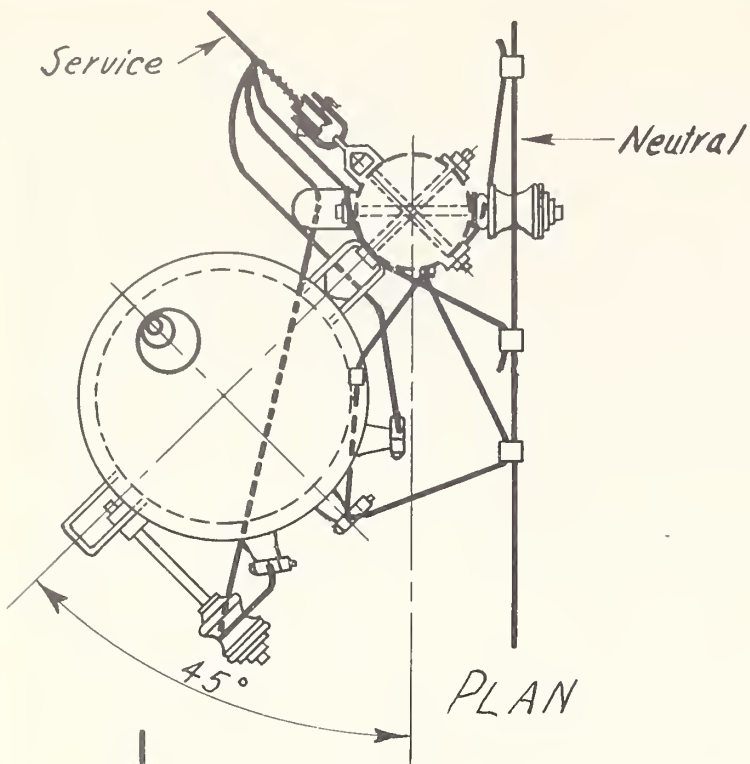
1/15/48

No

REVISION

DATE

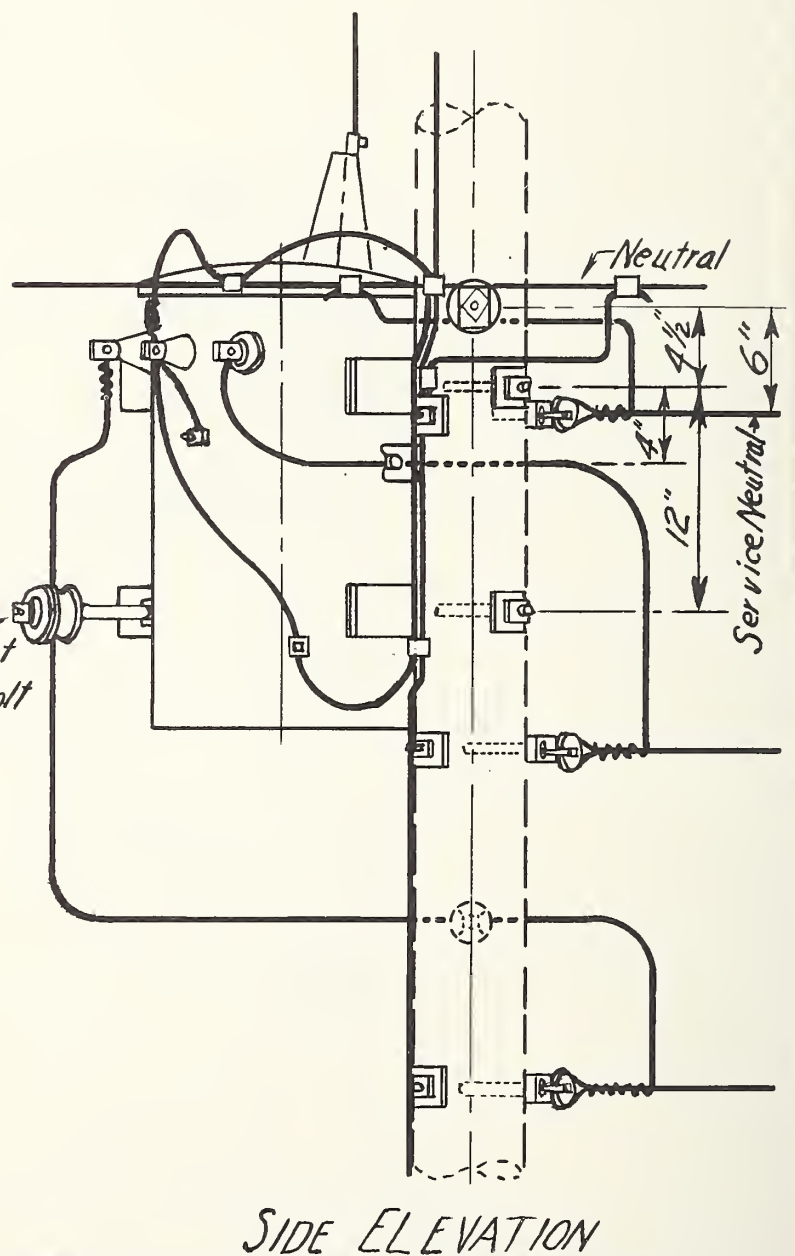
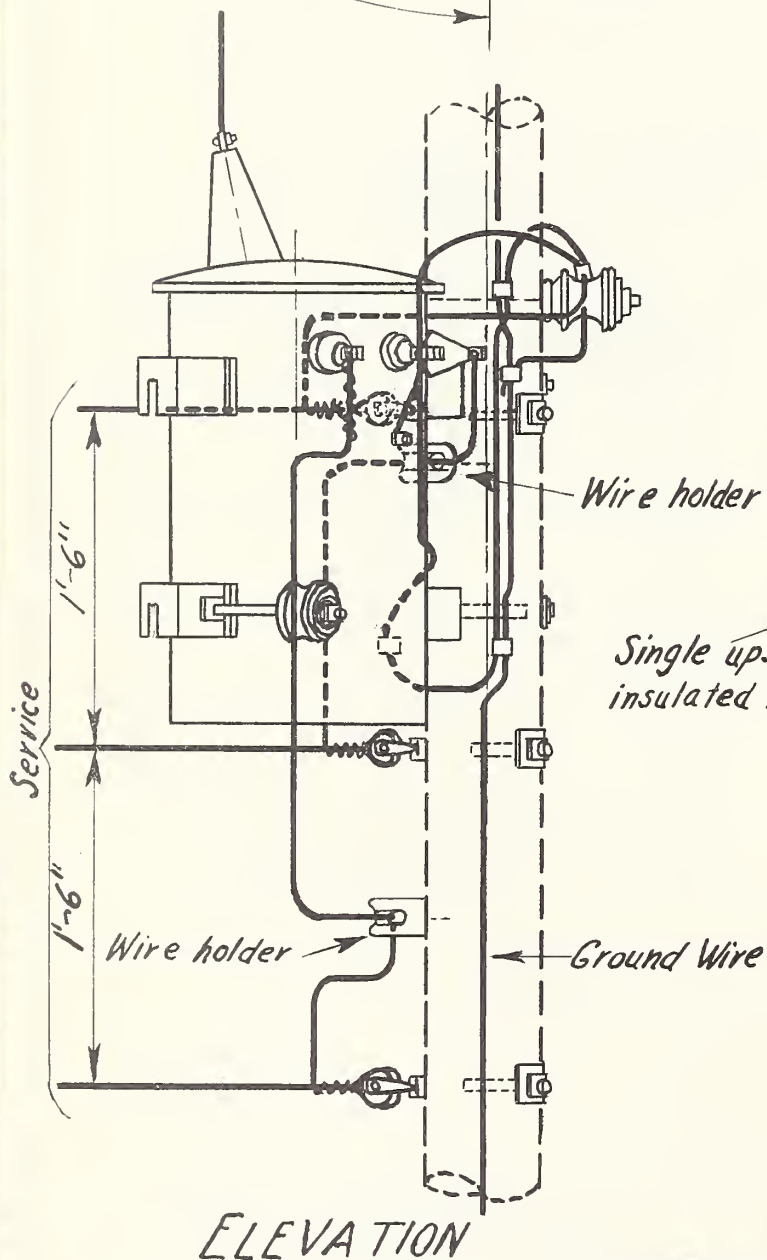
M28-1R



NOTE:

Services at angles of 60° or less with the line may be installed 12" higher.

With transformers having insulating caps for the primary bushing and lightning arresters on the unused transformer bracket all services may be in the higher position.



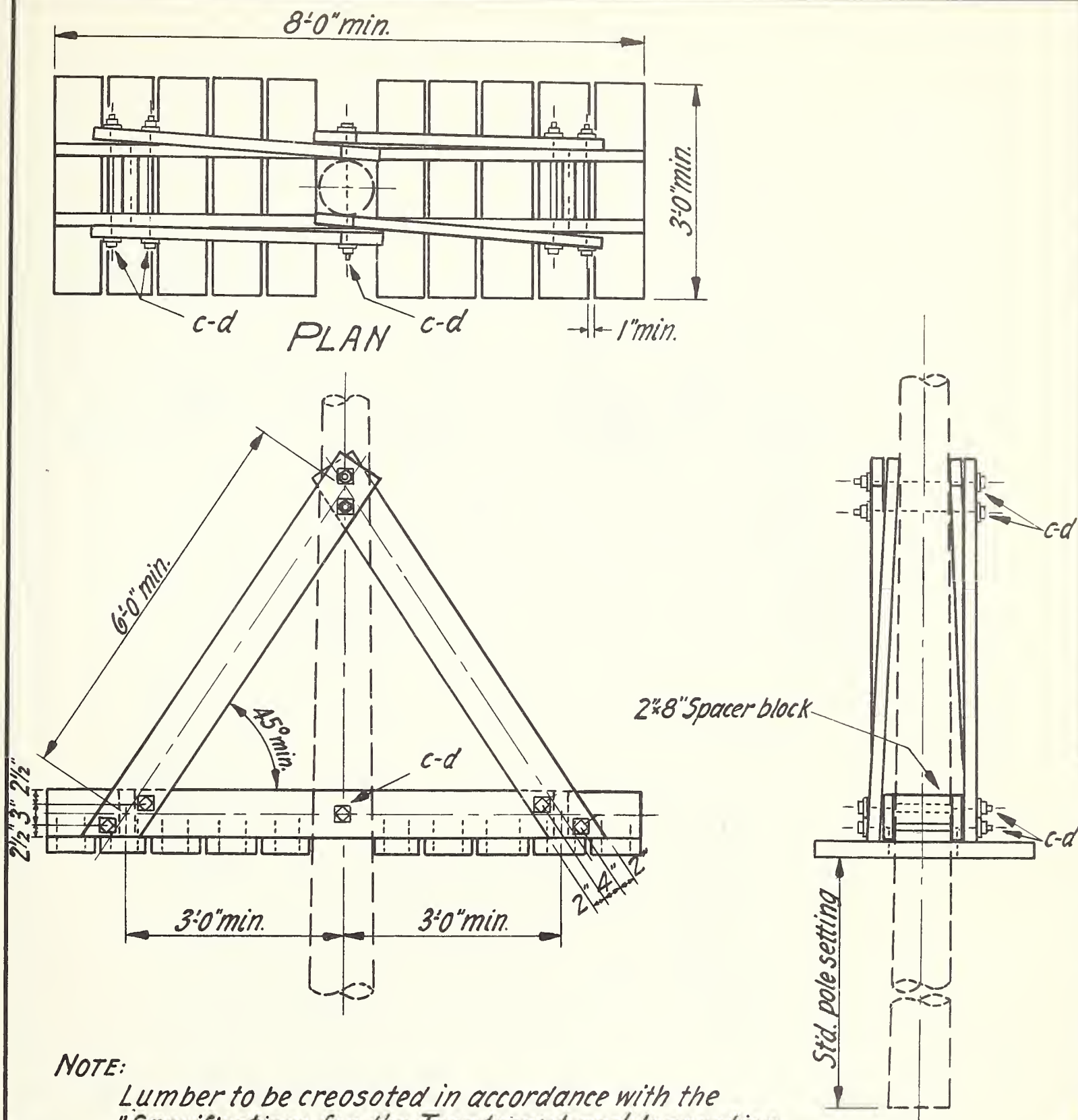
SERVICE OR SECONDARY CONNECTION GUIDE
CONVENTIONAL TRANSFORMER

Scale: 1"=1'-0"

Date: Apr. 12, '49

No. REVISION DATE

M28-3R



NOTE:

Lumber to be creosoted in accordance with the "Specifications for the Treatment and Inspection of Treated Timber."

ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
c	7	Bolt, machine, 5/8" req'd. length	4	Lumber, 2x8x7'-0", creosoted	
d	14	Washer, 2 1/4 x 2 1/4 x 3/16", 1 3/16" hole	10	Lumber, 2x8x3'-0", creosoted	
bp		Nail, 20d.	2	Spacer block, 2x8", creosoted	
	2	Lumber 2x8x8'-0", creosoted			

BOG SHOE ASSEMBLY GUIDE

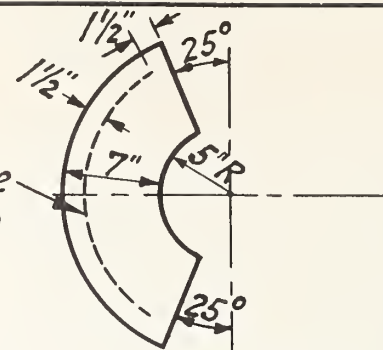
Scale: 1/2" = 1'-0"

Date:

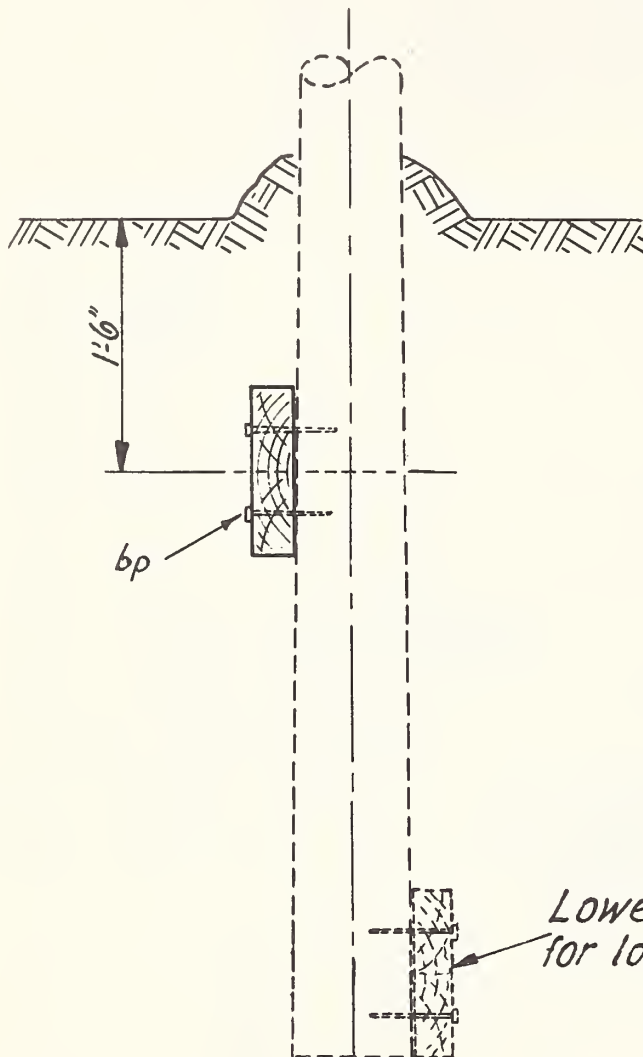
M31-1

No. REVISION DATE

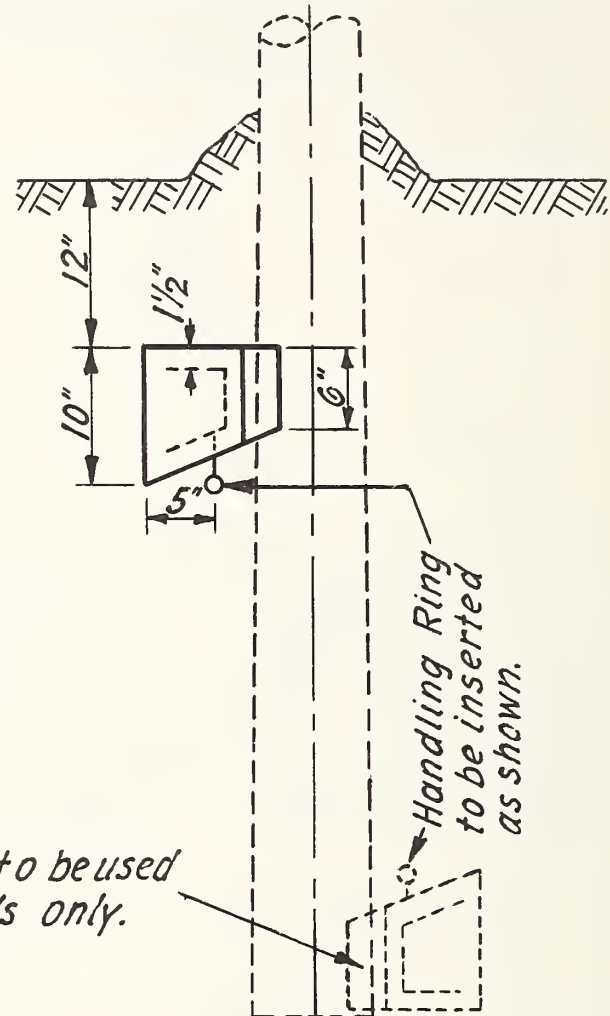
Reinforcing #6 galv. steel wire
Concrete of 1-2-4 mix to
be properly cured.



PLAN OF
PRE-CAST CONCRETE KEY



UNIT M32-1



UNIT M32-2

Lower keys to be used
for loose soils only.

ASSEMBLY UNIT			
	M32-1	M32-2	
ITEM	No. REQ'D.	No. REQ'D.	
bp Nails, 60-penny	2		
Creosoted plank, 3x12x3'0", or equivalent	1		
Key, pre-cast reinf. concrete		1	

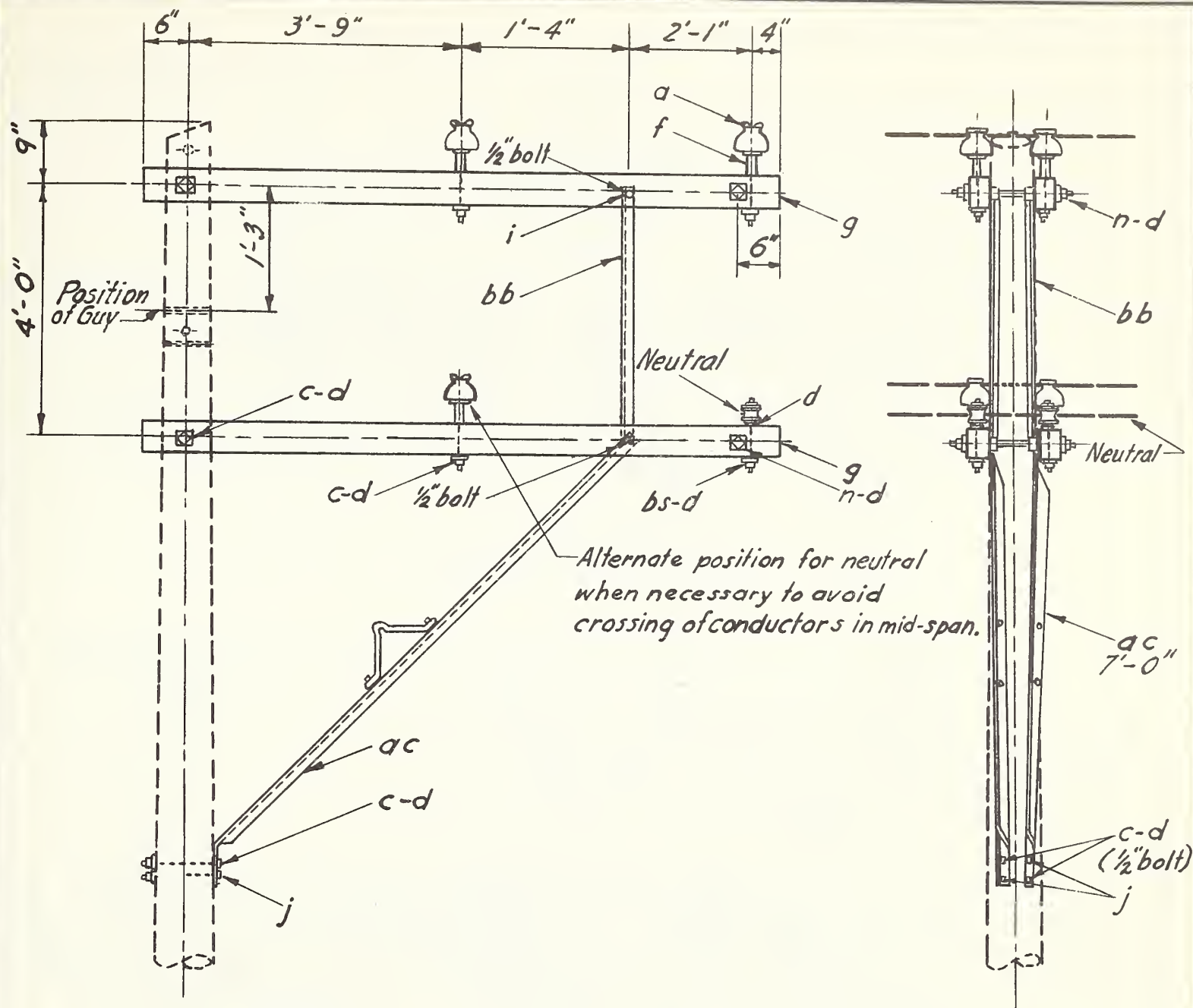
POLE KEY ASSEMBLY

Scale: 3/4"=1'-0"

Date:

M32-1, M32-2

No. REVISION DATE



NOTE:

Where these assemblies are required, spans shall be shortened, as at crossings.

Unit	Assembly Description	Number of each item required										
		a	c	d	f	g	i	j	n	bs	ac	bb
M33-1	Single Arm Single Phase	1	3	7	1	2	2	1	0	1	1	1
M33-2	Double Arm Single Phase	2	4	18	2	4	4	2	2	2	2	2
M33-3	Single Arm Two Phase	2	3	7	2	2	2	1	0	1	1	1
M33-4	Double Arm Two Phase	4	4	18	4	4	4	2	2	2	2	2
M33-5	Single Arm Three Phase	3	3	7	3	2	2	1	0	1	1	1
M33-6	Double Arm Three Phase	6	4	18	6	4	4	2	2	2	2	2

CONDUCTOR
1
ARL 11

-----KV. PRIMARY, 3-PHASE 4-WIRE STAR
TWO SIDELARMS(DOUBLE)FOR PRIMARY

Scale: 1/2"=1'-0"

Date:

1. Chge. neutral support and position 6/1/4/4

NO. REVISION

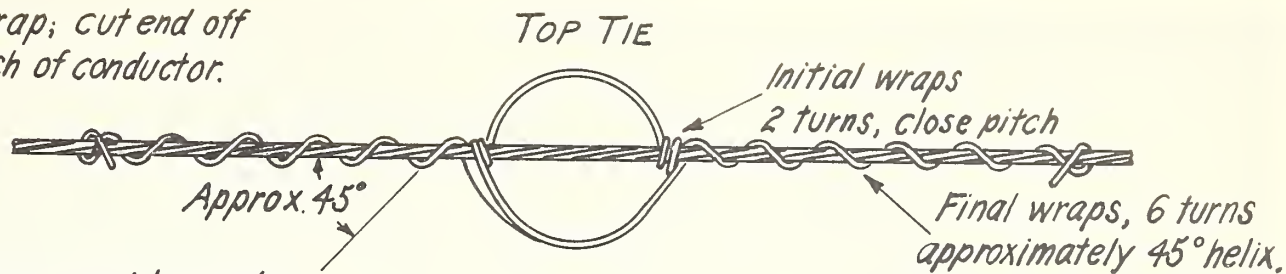
Date: M33-1R, M33-2R, M33-3R, M33-4R, M33-5R, M33-6R



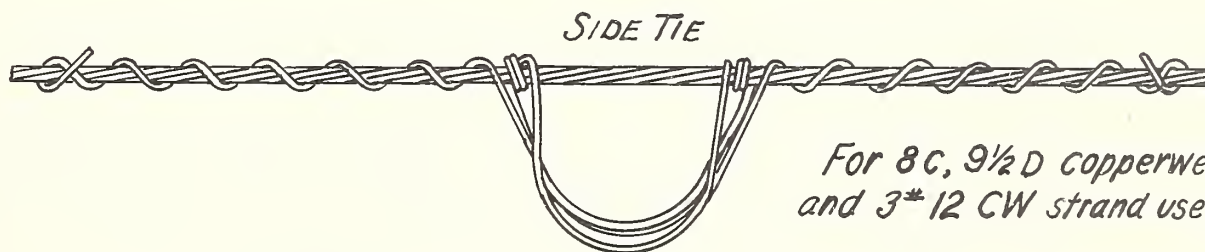
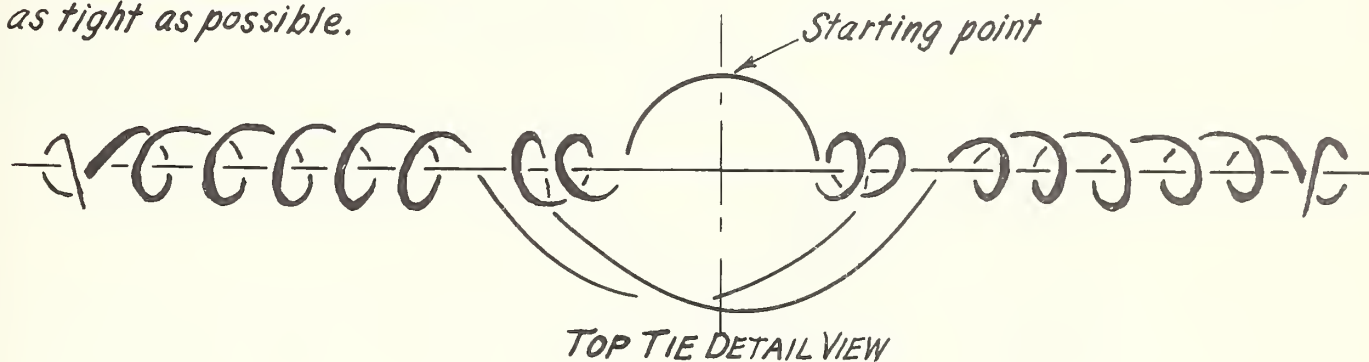
The separation between conductors in any plane shall not be less than required by the N.E.S.C. for horizontal separation.

			<p align="center"><i>SPECIAL CONSTRUCTION GUIDE</i> <i>SECONDARY</i></p>	
1.	Minor changes	6/4/88	Scale: $\frac{1}{4}" = 1'-0"$	Date:
NO.	REVISION	Date:		M37R

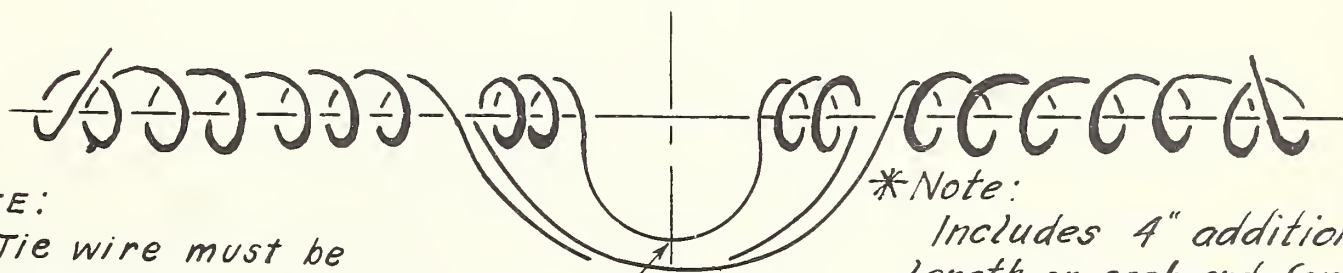
Tight wrap; cut end off within 1/2 inch of conductor.



All wraps must be made as tight as possible.



For 8C, 9 1/2 D copperweld-copper and 3* 12 CW strand use same as 8A C.W.



NOTE:

Tie wire must be annealed copper.

*Note:

Includes 4" additional length on each end for convenience in applying tie.

CONDUCTOR	SIZE OF TIE WIRE AWG.	LENGTH OF TIE WIRE INCHES *	
		TOP TIE	SIDE TIE
3/0-7 Strand HD Copper	4	60	66
2/0-7 Strand HD Copper	4	58	64
1/0-7 Strand HD Copper	4	56	62
2 - 3 Strand Copper	6	54	60
4A Copperweld-Copper	6	52	58
4 Copper Wire	6	50	56
6 Copper Wire	8	46	52
6A Copperweld-Copper	8	46	52
8A & 8D Copperweld-Copper	8	44	50

TYING GUIDE, SINGLE INSULATOR COPPER AND COPPERWELD-COPPER

Scale: N.T.S.

Date: Apr. 12, 1948

1 Table Revised

11/15/48

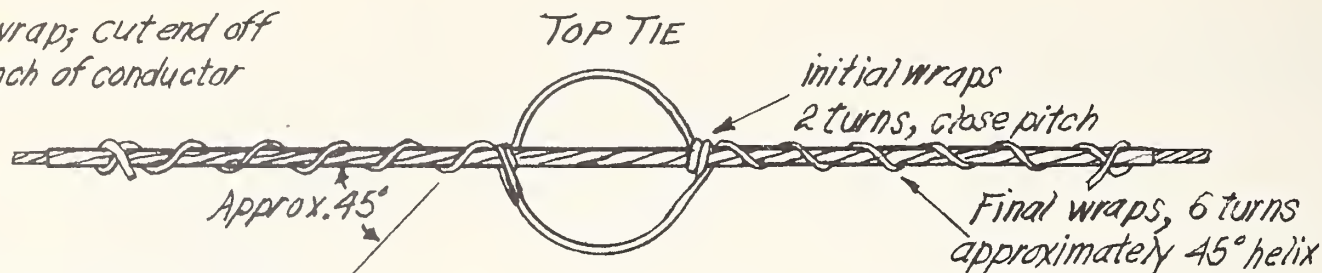
No.

REVISION

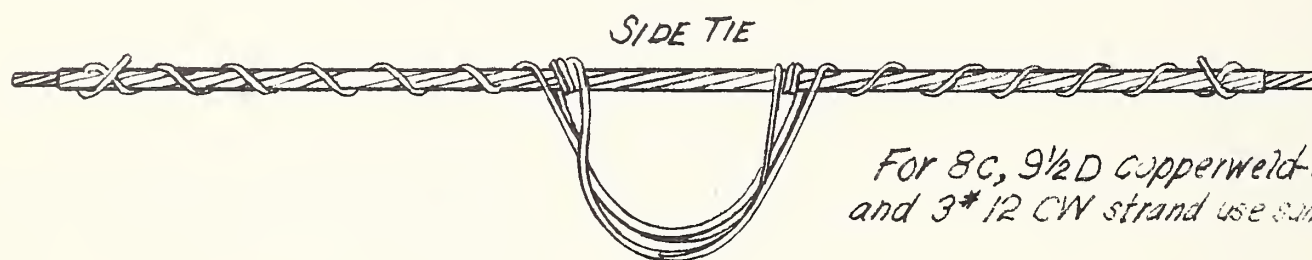
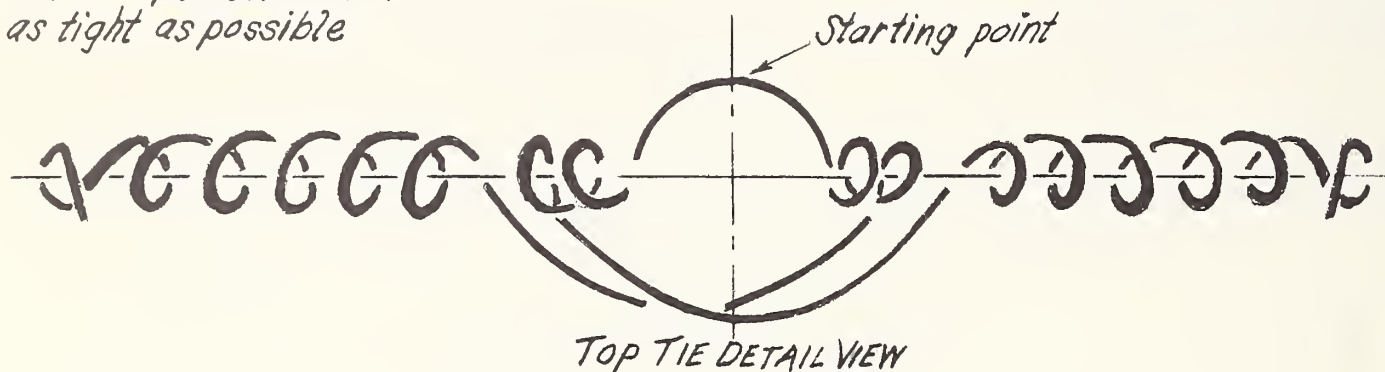
DATE

M40-1R

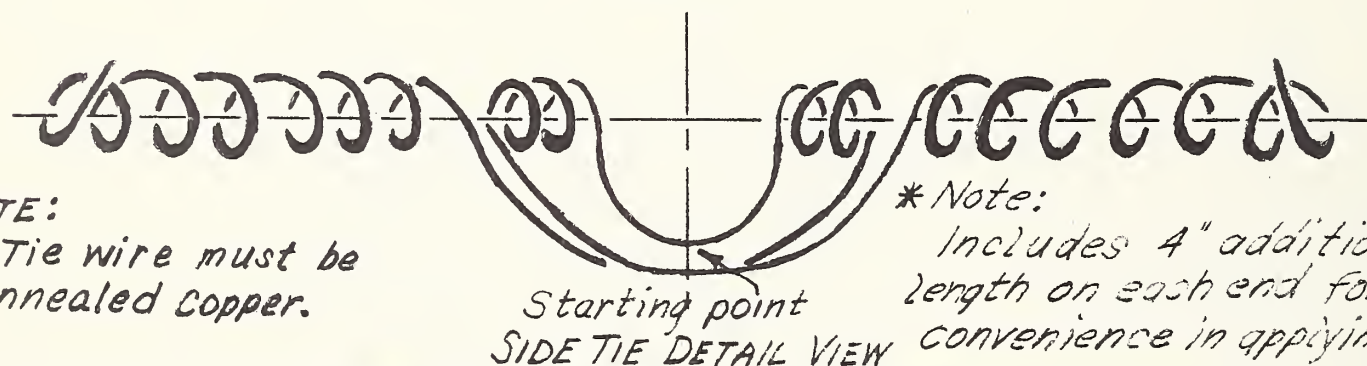
Tight wrap; cut end off
within 1/2 inch of conductor



All wraps must be made
as tight as possible



For 8c, 9 1/2 D copperweld-copper
and 3*12 CW strand use same as SACW.



NOTE:

Tie wire must be
annealed copper.

* Note:

Includes 4" additional
length on each end for
convenience in applying tie.

CONDUCTOR	CONDUCTOR DIAMETER	ARMOR ROD DIAMETER	OVERALL DIAMETER	SIZE OF COPPER TIE WIRE AWG.	TOP TIE * LENGTH	SIDE TIE * LENGTH
3/0-7 Strand HD copper	.464"	.162"	.788"	4	110"	115"
2/0-7 Strand HD copper	.414"	.162"	.738"	4	104"	110"
1/0-7 Strand HD copper	.369"	.128"	.624"	4	90"	95"
2-3 Strand copper	.320"	.128"	.576"	6	82"	83"
4A Copperweld-Copper	.290"	.102"	.494"	6	72"	73"
4 Copper wire	.204"	.102"	.408"	6	66"	72"
6 Copper wire	.162"	.102"	.366"	8	60"	66"
6A Copperweld-copper	.230"	.102"	.434"	8	65"	71"
8A & 8D Copperweld-Copper	.219"	.102"	.423"	9	64"	70"

TYING GUIDE, SINGLE INSULATOR.
ONE-PIECE TIE. COPPER TYPE CONDUCTORS
WITH PREFORMED ARMOR RODS.

Scale: N.T.S.

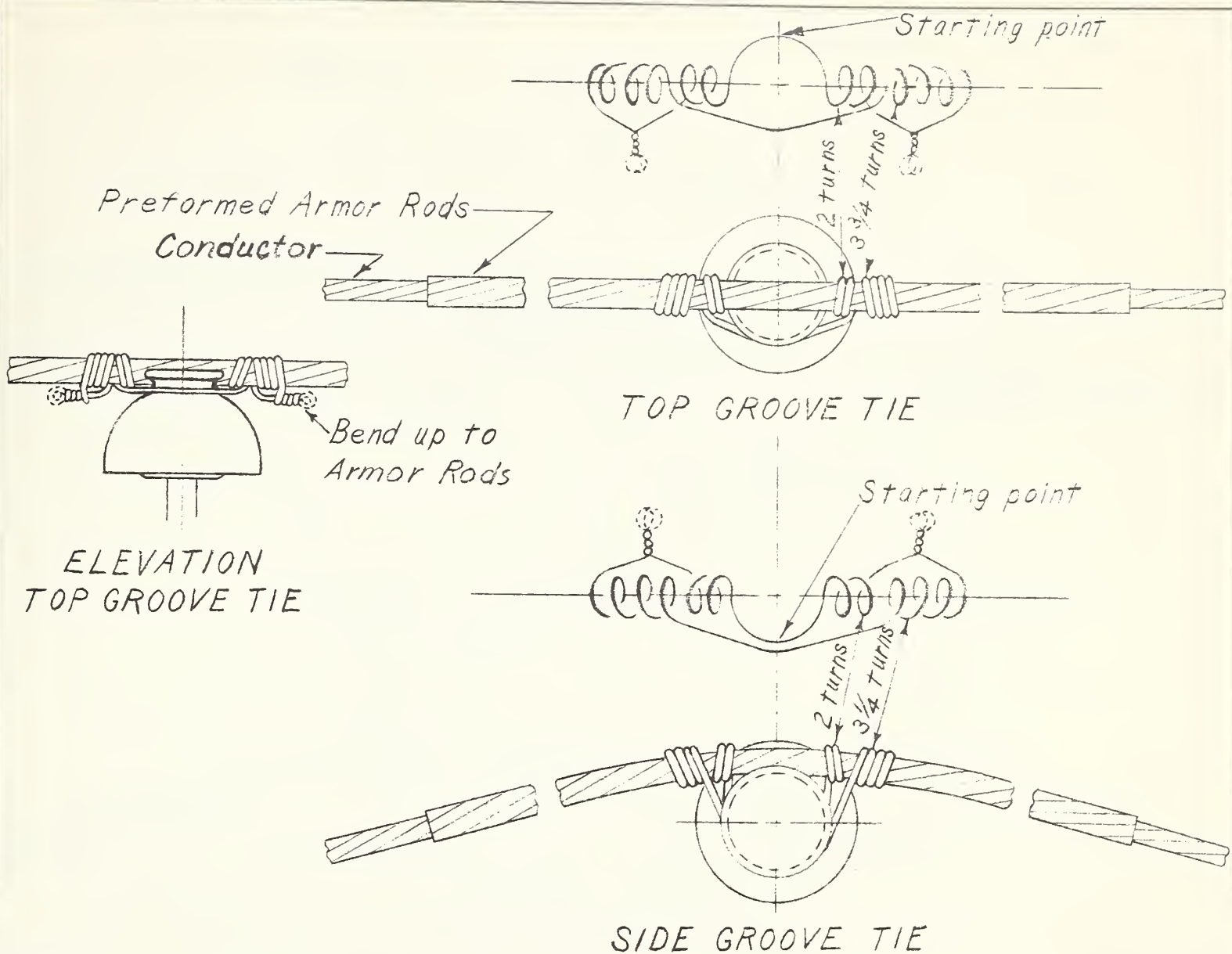
May 21, 1952

No.

REVISION

DATE:

M40-1A



Note:

Tie wire assembly should be as tight as can be wrapped by hand, and ends twisted with pliers or hot line tools. Twist lefthand ends clockwise, righthand counterclockwise. With hot line loops, tie wires must be 8" longer than shown.

Tie wire lengths listed below can be used with insulators having a neck diameter up to and including 3 1/2 inches.

For 8C, 9 1/2 D copperweld-copper and 3#12 CW strand use same as 8A CWC.

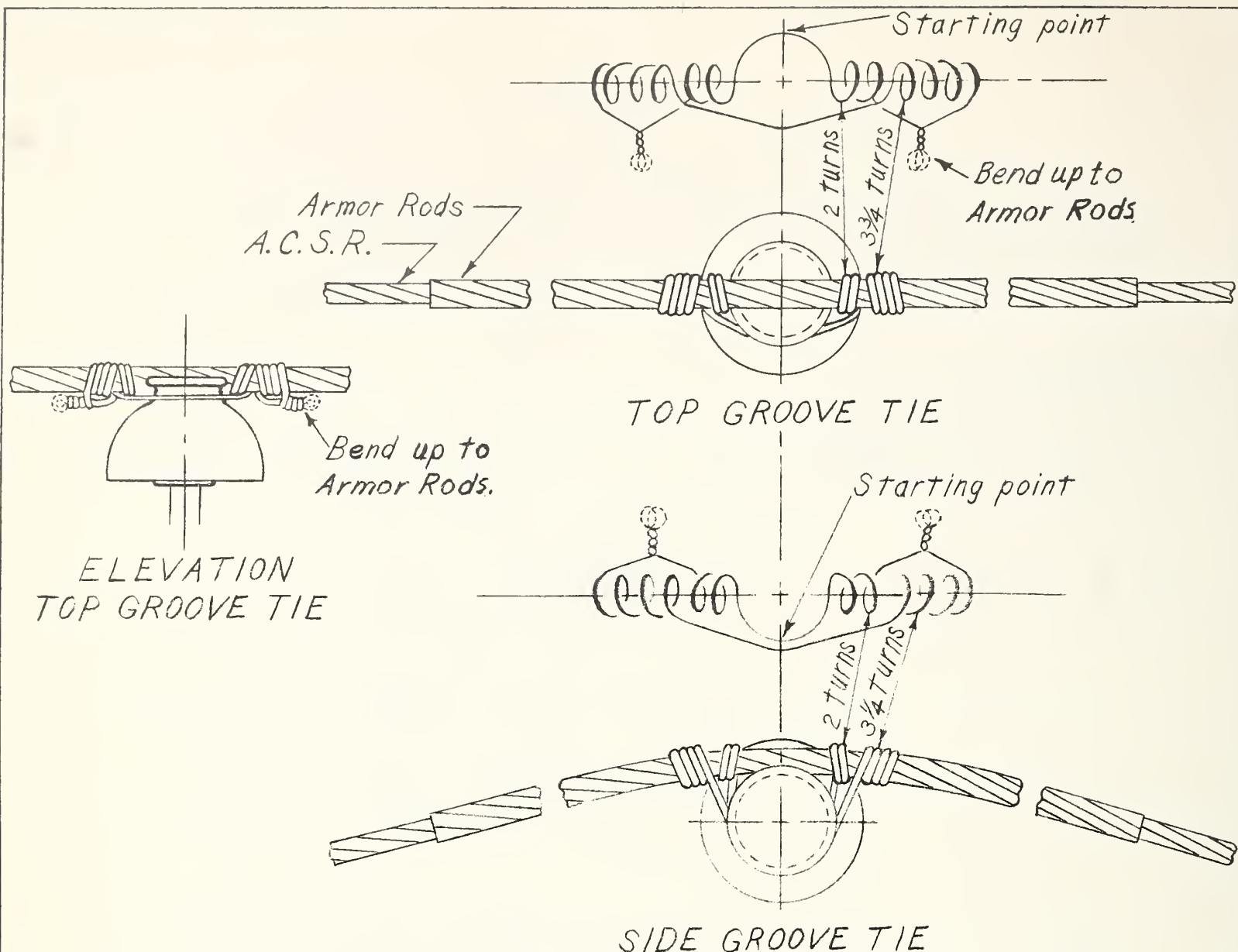
CONDUCTOR	CONDUCTOR DIAMETER	ARMOR ROD DIAMETER	OVERALL DIAMETER	ANNEALED COPPER TIE WIRE		
				SIZE	LENGTH SHORT PIECE	LENGTH LONG PIECE
3/0-7 Strand HD Copper	.464"	.162"	.788"	4	27"	40"
2/0-7 Strand HD Copper	.414"	.162"	.738"	4	27"	40"
1/0-7 Strand HD Copper	.368"	.128"	.624"	4	27"	40"
2-3 Strand Copper	.320"	.128"	.576"	6	23"	35"
4A Copperweld-Copper	.290"	.102"	.494"	6	23"	35"
4 Copper wire	.204"	.102"	.408"	6	23"	35"
6 Copper wire	.162"	.102"	.366"	8	21"	30"
6A Copperweld-Copper	.230"	.102"	.434"	8	21"	30"
8A and 8D Copperweld-Copper	.219	.102"	.423"	8	21"	30"

TYING GUIDE, SINGLE INSULATOR
TWO-PIECE TIE. COPPER TYPE CONDUCTORS
WITH PREFORMED ARMOR RODS

Scale: N.T.S.

Date: Oct. 31, 1951

No.	REVISION	DATE	M40-1A2
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Note:

Tie wire assembly should be as tight as can be wrapped by hand, and ends twisted with pliers or hot line tools. Twist lefthand ends clockwise, righthand counterclockwise. With hot line loops, tie wires must be 8" longer than shown.

Tie wire lengths listed below can be used with insulators having a neck diameter up to and including 3 1/2 inches.

For installations of ACSR in locations where atmospheric corrosion is of major importance use galvanized soft steel tie wire with Class "B" coating as specified by engineer. In other cases use class "A" coating.

A. C. S. R.		Diam. over	Galv. Soft Steel Tie Wire		A. C. S. R.		Diam. over	Galv. Soft Steel Tie Wire	
Size	Cond. Diam.	Armor Rods	Size BWG	Length Both Pieces	Size	Cond. Diam.	Armor Rods	Size BWG	Length Both Pieces
4/0	.563	.927	10	39"	1	.355	.643	10	29"
3/0	.502	.836	10	39	2	.325	.604	11	27
2/0	.447	.781	10	31	4	.257	.545	12	25
1/0	.398	.732	10	31					

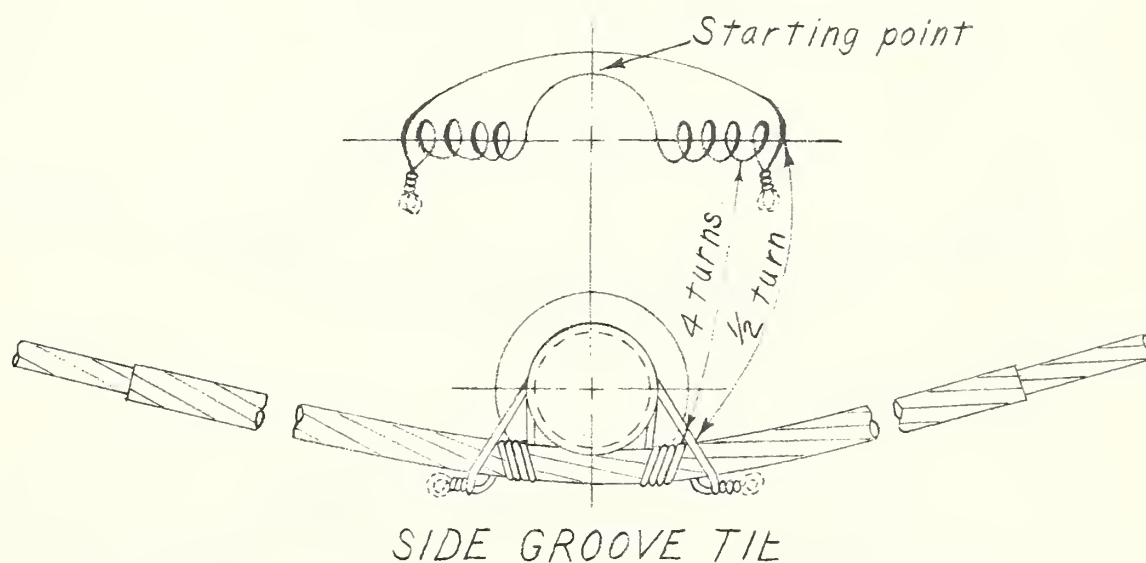
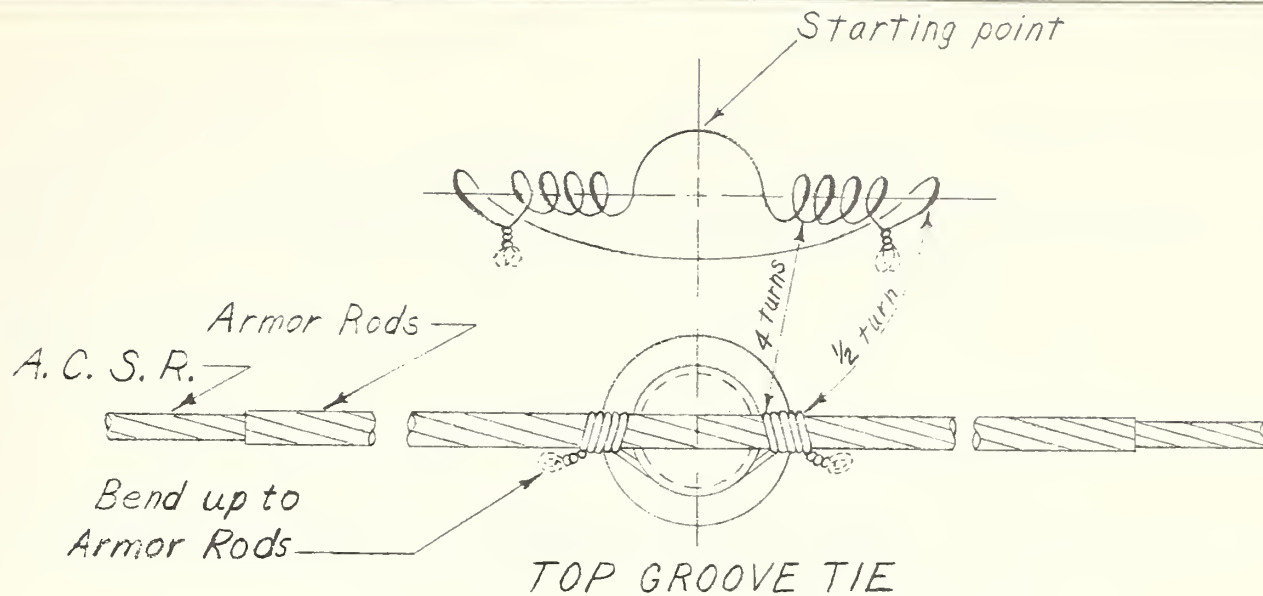
TYING GUIDE, SINGLE INSULATOR
TWO-PIECE STEEL-WIRE TIE, A.C.S.R. CONDUCTOR
ALUMINUM ALLOY, STRAIGHT OR PREFORMED ARMOR RODS

Scale: N.T.S.

Date: Oct. 30, 1951

1	Table revised	2-9-52
No.	REVISION	DATE

M40-2R1



NOTE:

Tie wire assembly should be as tight as can be wrapped and ends twisted with hot line tools. Twist lefthand ends clockwise, righthand counterclockwise.

Tie wire lengths listed below can be used with insulators having a neck diameter up to and including 3 1/2 inches.

For installations of ACSR in locations where atmospheric corrosion is of major importance use galvanized soft steel tie wire with Class "B" coating as specified by engineer. In other cases use Class "A" coating.

A. C. S. R.			DIAM. OVER			GALV. SOFT STEEL TIE WIRE			A. C. S. R.			DIAM. OVER			GALV. SOFT STEEL TIE WIRE		
SIZE	COND. DIAM.	ARMOR RODS	SIZE	1st	2nd	SIZE	1st	2nd	SIZE	COND. DIAM.	ARMOR RODS	SIZE	1st	2nd	SIZE	1st	2nd
4/0	.563"	.927"	10	42"	23"	1	.355"	.643"	10	35"	22"	10	35"	22"	10	35"	22"
3/0	.502	.836	10	40	23	2	.325	.604	11	34	22	11	34	22	11	34	22
2/0	.447	.781	10	39	23	4	.257	.545	12	32	22	12	32	22	12	32	22
1/0	.398	.732	10	38	23												

HOT LINE TYING GUIDE, SINGLE INSULATOR
TWO-PIECE STEEL-WIRE TIE, A.C.S.R. CONDUCTOR
ALUMINUM ALLOY, STRAIGHT OR PREFORMED ARMOR RODS

1	Table revised	2-4-52	Scale: N.T.S.	Date: Nov. 1, 1951
No.	REVISION	DATE		M40-6R

Tight wrap; cut end off
within 1/2 inch of conductor

TOP TIE

Initial wraps

2 turns, close pitch

approx. 45°

Final wraps, 6 turns
approximately 45° helix

Starting point

TOP TIE DETAIL VIEW

SIDE TIE

* NOTE:

Includes 4" additional length on
each end for convenience in applying tie.

Starting point

SIDE TIE DETAIL VIEW

NOTE:

Tie wire must be
annealed copper

For 8C, 9 1/2 D copper weld-copper
and 3 #12 CW strand use same as 3AC.W.

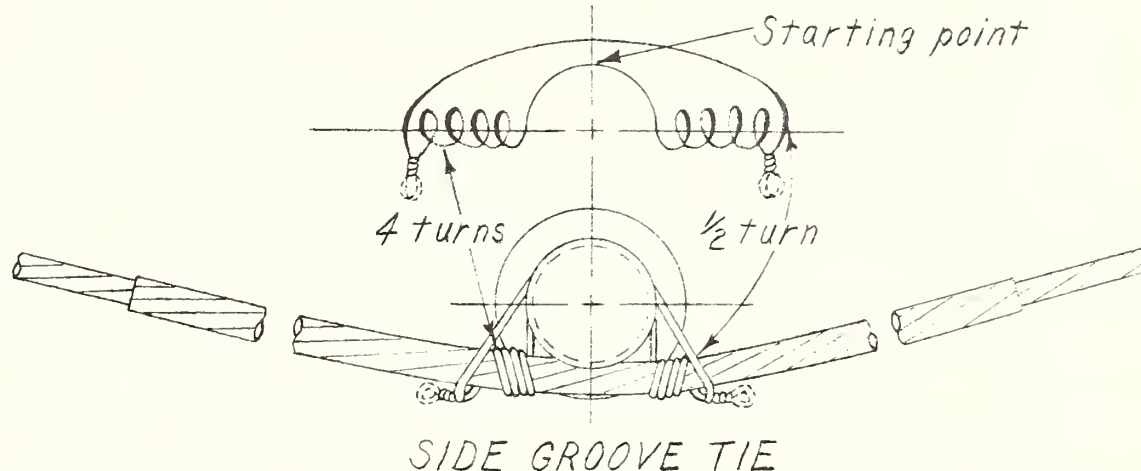
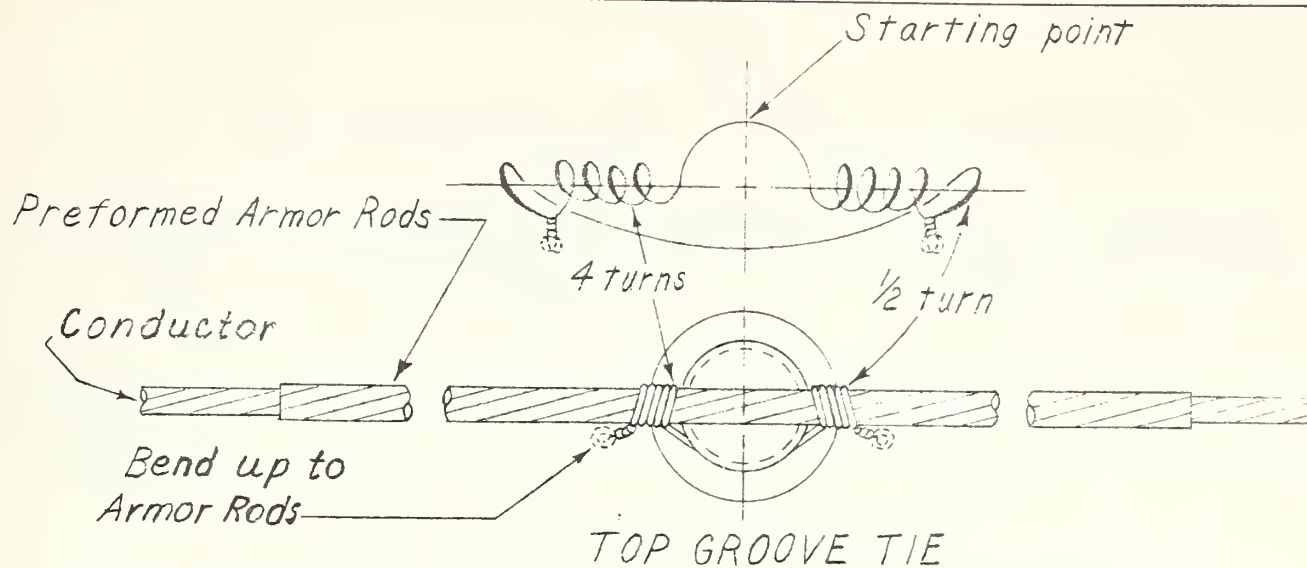
CONDUCTOR	SIZE OF TIE WIRE ANG.	LENGTH OF TIE WIRE INCHES *	
		TOP TIE	SIDE TIE
3/0 - 7 Strand HD Copper	4	60	66
2/0 - 7 Strand HD Copper	4	53	64
1/0 - 7 Strand HD Copper	4	56	62
2 - 3 Strand Copper	5	54	60
4A Copperweld-Copper	6	52	53
4 Copper Wire	6	50	56
6 Copper Wire	8	46	52
6A Copperweld-Copper	8	44	50
8A and 8D Copperweld-Copper	5	44	50

TYING GUIDE, DOUBLE INSULATOR
COPPER TYPE CONDUCTORS

Scale: N.T.S.

Date: 10/12/20

M40-7



NOTE:

Tie wire assembly should be as tight as can be wrapped and ends twisted with hot line tools. Twist lefthand ends clockwise, righthand counterclockwise.

Tie wire lengths listed below can be used with insulators having a neck diameter up to and including 3 1/2 inches.

For 8C, 9 1/2D copperweld-copper and 3#12 CW strand use same as 8A.

COPPERWELD COPPER		DIAM. OVER ARMOR RODS	ANNEALED COPPER TIE WIRE			COPPER		DIAM. OVER ARMOR RODS	ANNEALED COPPER TIE WIRE		
SIZE	COND. DIAM.		SIZE AWG	1st PIECE	2nd PIECE	SIZE	COND. DIAM.		SIZE AWG	1st PIECE	2nd PIECE
2F	.308"	.560"	6	34"	24"	4/0-7w	.522"	.846"	6	38"	29"
2A	.366	.622	6	36	24	3/0-7w	.464	.788	6	37	28
3A	.326	.582	6	34	24	2/0-7w	.414	.738	6	37	28
4A	.290	.494	6	33	24	1/0-7w	.368	.624	6	36	27
5A	.258	.462	6	33	24	2-3w	.320	.576	6	34	25
6A	.230	.434	8	32	23	2-Sol.	.258	.462	6	33	24
7A	.223	.427	8	32	23	4-Sol.	.204	.408	6	32	23
8A	.199	.403	8	31	23	6-Sol.	.162	.366	8	30	22

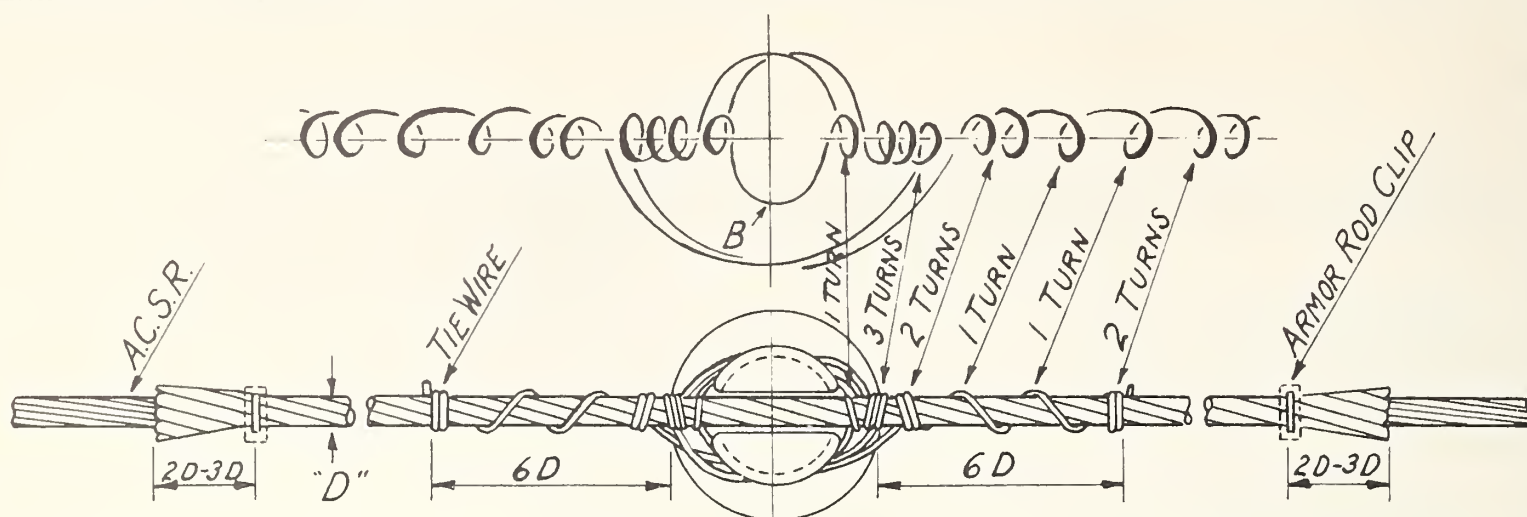
HOT LINE TYING GUIDE COPPER TYPE CONDUCTORS WITH PREFORMED ARMOR RODS

Scale: N.T.S.

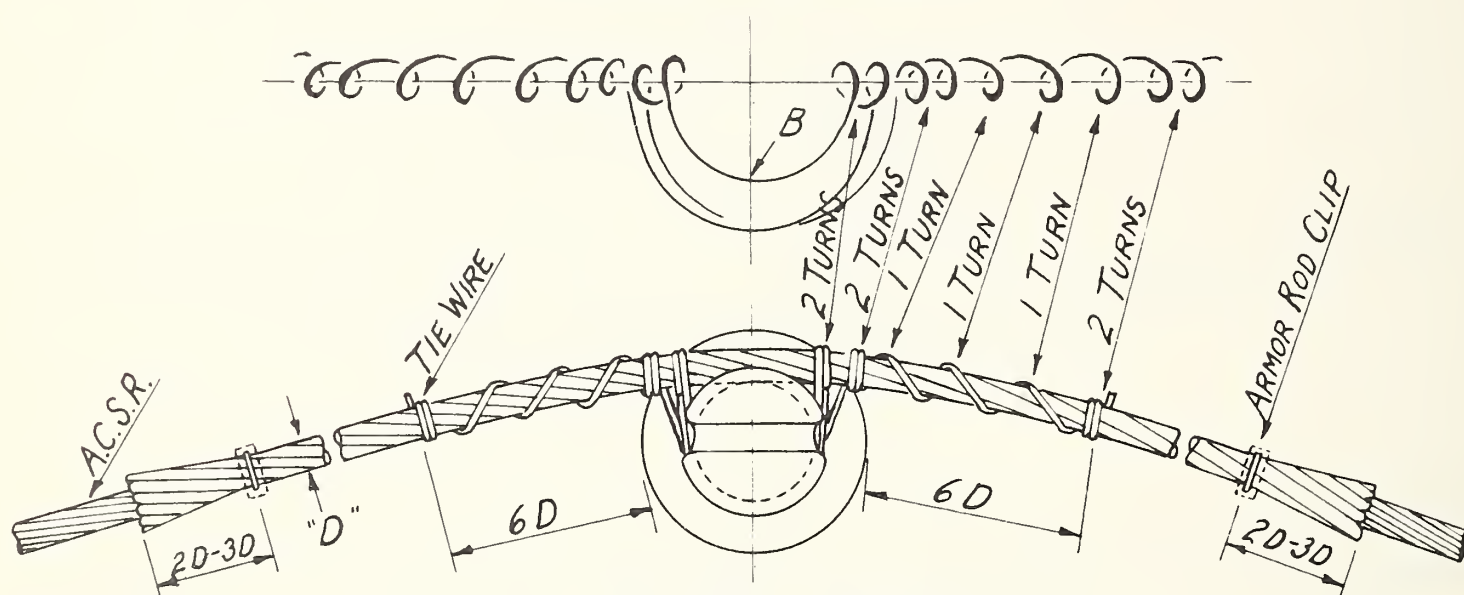
Date: Nov. 6, 1951

No. REVISION DATE

M40-8



TOP GROOVE DOUBLE TIE



SIDE GROOVE TIE

NOTE:

In making ties, start with middle of length of tie wire at position marked "B."

To complete tie, cinch up last two turns at each end with pliers until tie wire is snug and tight. Use the flat face of the pliers against the armor rods.

A.C.S.R.			ARMOR RODS		TIE WIRE Strong Alloy		A.C.S.R.			ARMOR RODS		TIE WIRE Strong Alloy	
SIZE	DIAM. INCHES	"D" DIAM. INCHES	SIZE	LENGTH FEET	SIZE	LENGTH FEET	SIZE	DIAM. INCHES	"D" DIAM. INCHES	SIZE	LENGTH FEET	SIZE	LENGTH FEET
4/0	0.563	0.939	7	9' 3"	1/0	0.398	0.744	7	8' 3"				
3/0	0.502	0.836	7	8' 9"	2	0.325	0.595	7	7' 5"				
2/0	0.447	0.745	7	8' 3"	4	0.257	0.555	7	7' 3"				

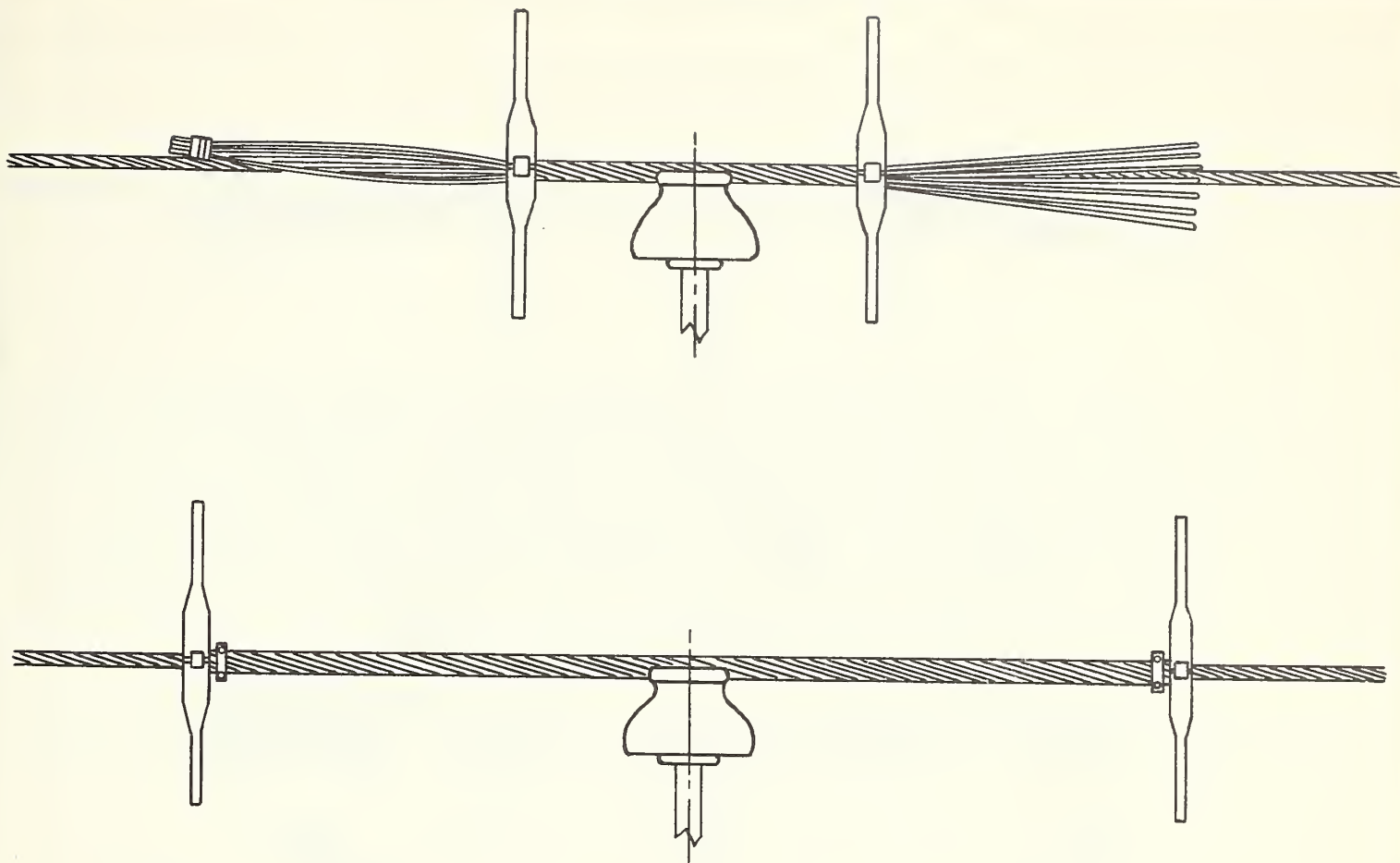
TYING GUIDE, SINGLE INSULATOR
ALUMINUM ALLOY TIE WIRE, A.C.S.R. CONDUCTOR
ALUMINUM ALLOY, STRAIGHT OR PREFORMED ARMOR RODS

Scale: N.T.S.

Date: Mar. 17, 1948

No REVISION DATE

M40-10R1



NOTE:

With tape still on one end of rods and other end threaded through wrenches so they open between the same two rods, center on conductor over point of support and close around conductor as shown above. Twist rods enough to give permanent set. Remove tape and slide wrenches half way to ends and repeat. Move wrenches to end of rods and twist. Attach clips and tighten before removing wrenches so ends of rods will flare after removal. Rods should be twisted snugly with a smooth lay in same direction as lay of conductor. For further information and method of installing rods on angle see manufacturer's Suggestions for Construction, A.C.S.R. Rural Lines.

CONDUCTOR SIZE	SUPPORT	
	SINGLE	DOUBLE
	TWISTS	
#4 A.C.S.R. (6Al/1St.) & (7Al/1St.)	5-6	7-8
#2 A.C.S.R. (6Al/1St.) & (7Al/1St.)	6-7	8-9
#1/0 A.C.S.R. (6Al/1St.)	4-5	6-7
#2/0 A.C.S.R. (6Al/1St.)	5-6	7-8
#3/0 A.C.S.R. (6Al/1St.)	5-6	7-8
#4/0 A.C.S.R. (6Al/1St.)	5-6	7-8

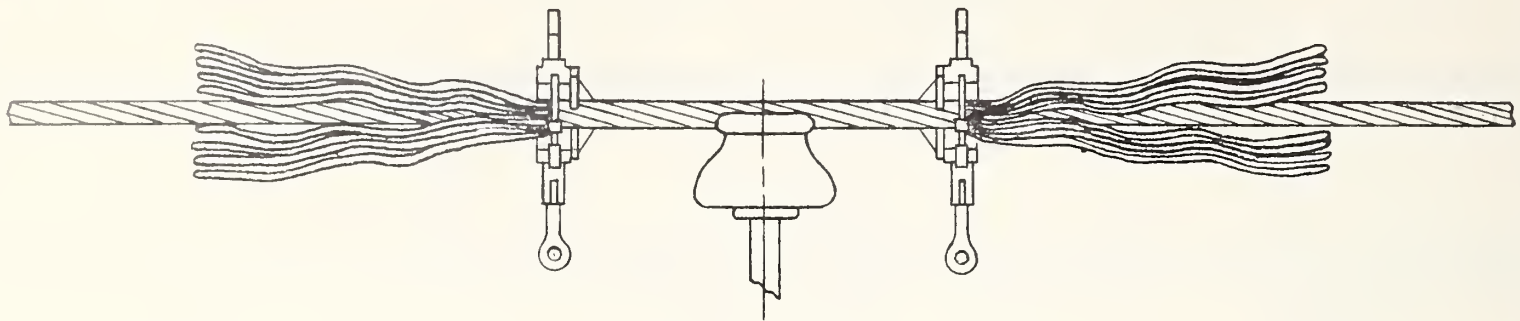
**ARMOR RODS
A.C.S.R. CONDUCTOR**

Scale: N.T.S.

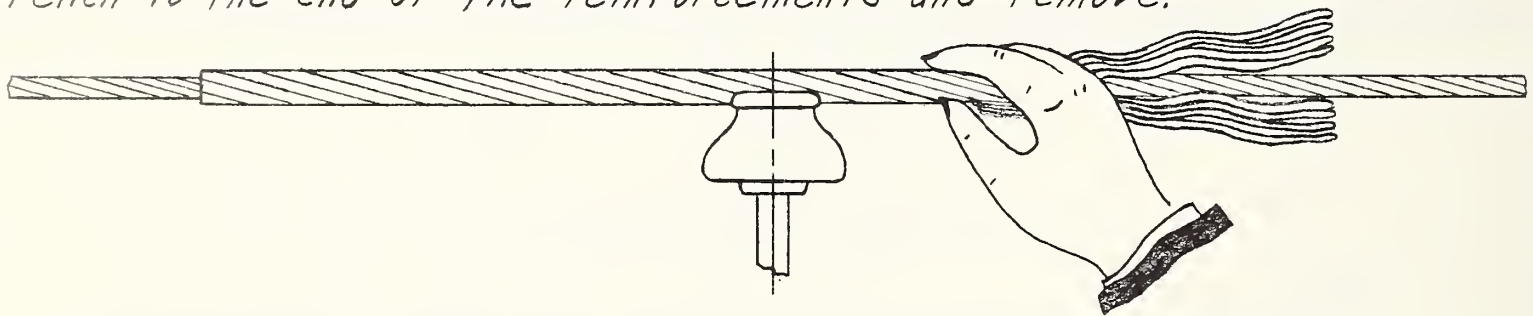
Date:

I.	Table Revised	3/18/48
NO.	REVISION	DATE

M40-11R



For tool application, insert half the reinforcements in one cavity and the other half in the other cavity of the open wrenches, keeping the ends even. Hook wrenches over the conductor and close jaws. Space wrenches approximately one reinforcement pitch apart and twist them in the same direction as the lay of the conductor. Wind each wrench to the end of the reinforcements and remove.



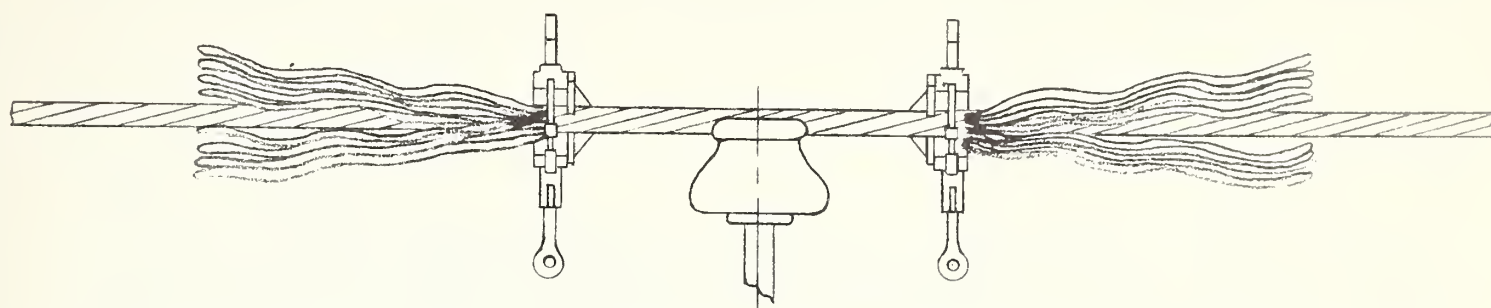
For hand application, hold one or more reinforcements against the conductor with midpoint at the insulator, and rotate in same direction as the lay of the conductor, for three or four inches each side of center. In like manner apply remaining reinforcements to center section. After all have been started, complete the application by a rotary outward wiping motion of the hand. Make certain that the ends snap into place in proper order.

PREFORMED ALUMINUM ALLOY ARMOR RODS

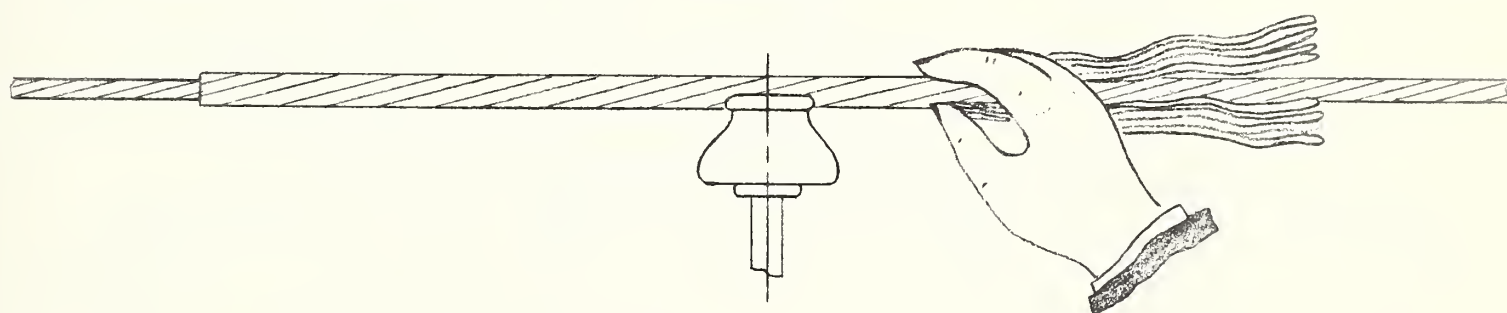
A.C.S.R.	LENGTH SINGLE SUPPORT	LENGTH DOUBLE SUPPORT	NO. PER SET	WIRE DIAM. (IN.)	DIAM. PLUS RODS	A.C.S.R.	LENGTH SINGLE SUPPORT	LENGTH DOUBLE SUPPORT	NO. PER SET	WIRE DIAM. (IN.)	DIAM. PLUS RODS
4/0(6x1)	60"	72"	11"	.182	.927	2 (7x1)	44"	56"	9	.146	.613
3/0(6x1)	56	68	11	.167	.836	2 (6x1)	44	56	9	.146	.604
2/0(6x1)	54	66	10	.167	.781	4 (7x1)	40	52	7	.146	.545
1/0(6x1)	52	64	9	.167	.732	4 (6x1)	40	52	7	.146	.538
1 (6x1)	48	60	9	.146	.643						

PREFORMED ARMOR RODS A.C.S.R. CONDUCTORS

1	Revised table	1-24-52	Scale: N.T.S.	DATE: JAN. 24, 1952
NO.	REVISION	DATE		M40-12R1



For tool application, insert half the reinforcements in one cavity and the other half in the other cavity of the open wrenches, keeping the ends even. Hook wrenches over the conductor and close jaws. Space wrenches approximately one reinforcement pitch apart and twist them in the same direction as the lay of the conductor. Wind each wrench to the end of the reinforcements and remove.



For hand application, hold one or more reinforcements against the conductor with midpoint at the insulator, and rotate in same direction as the lay of the conductor, for three or four inches each side of center. In like manner apply remaining reinforcements to center section. After all have been started, complete the application by a rotary outward wiping motion of the hand. Make certain that the ends snap into place in proper order.

If lay of conductor is right-hand instead of as indicated, special armor rods should be obtained with the same lay.

PREFORMED BRONZE OR COPPER TYPE ARMOR RODS

CONDUCTOR	LENGTH SINGLE SUPPORT	LENGTH DOUBLE SUPPORT	NO. PER SET	WIRE DIAM. (IN)	DIAM. PLUS RODS	CONDUCTOR	LENGTH SINGLE SUPPORT	LENGTH DOUBLE SUPPORT	NO. PER SET	WIRE DIAM. (IN)	DIAM. PLUS RODS
3/0x7	56"	68"	11	.162	.788	4 Solid	40"	52"	8	.102	.408
2/0x7	56"	68"	10	.162	.738	6 Solid	40"	52"	7	.102	.366
1/0x7	50"	62"	10	.128	.624	6 A.C.W.C	40"	52"	9	.102	.434
2x3	46"	58"	9	.128	.576	8 A.C.W.C	40"	52"	8	.102	.403
4 A.C.W.C	42"	54"	10	.102	.494						

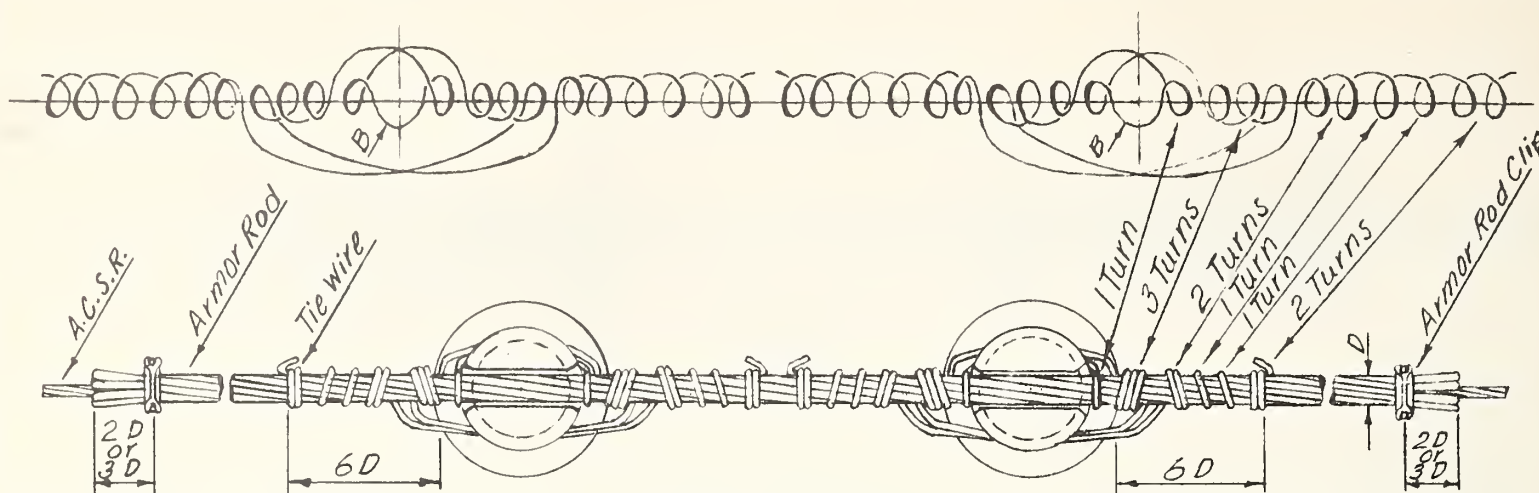
PREFORMED ARMOR RODS COPPER TYPE CONDUCTORS

Scale: N.T.S.

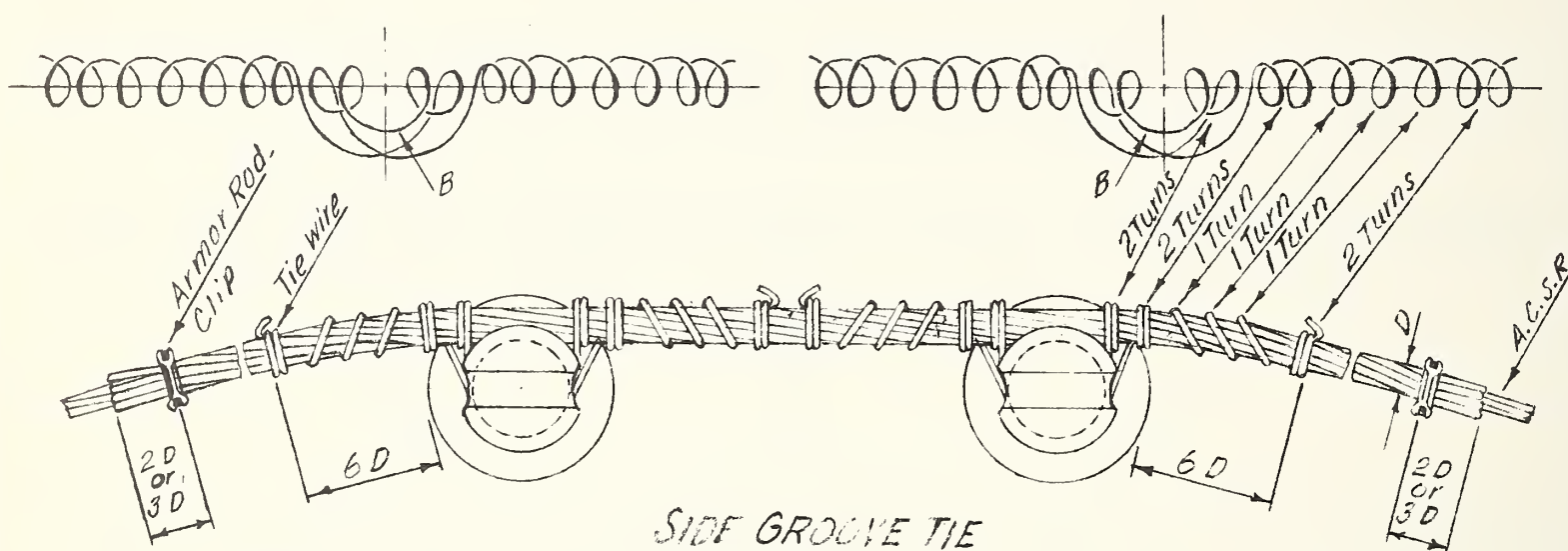
DATE: JAN. 22, 1952

NO. REVISION DATE

M40-13



TOP GROOVE DOUBLE TIE



SIDE GROOVE TIE

NOTE:

In making ties, start with middle of length of tie wire at position marked "B".

To complete tie, cinch up last two turns at each end with pliers until tie wire is snug and tight.

Use the flat face of the pliers against the armor rods.

A.C.S.R.		ARMOR RODS		TIE WIRE Strong Alloy		A.C.S.R.		ARMOR RODS		TIE WIRE Strong Alloy	
SIZE	DIAM. INCHES	"D" DIAM. INCHES	SIZE	LENGTH FEET	SIZE	DIAM. INCHES	"D" DIAM. INCHES	SIZE	LENGTH FEET	SIZE	LENGTH FEET
4/0	0.553	0.939	7	9'-3"	1/0	0.398	0.744	7	8'-3"		
3/0	0.502	0.936	7	8'-9"	2	0.325	0.595	7	7'-5"		
2/0	0.447	0.745	7	8'-3"	4	0.257	0.555	7	7'-3"		

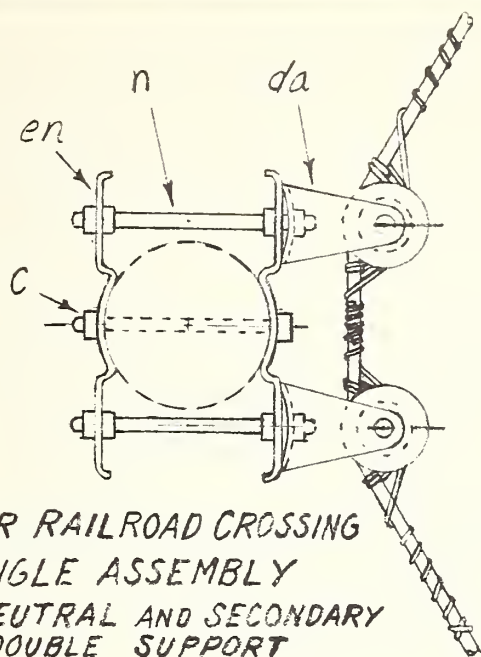
TYING GUIDE, DOUBLE INSULATOR
ALUMINUM ALLOY TIE WIRE, A.C.S.R. CONDUCTOR
ALUMINUM ALLOY, STRAIGHT OR PREFORMED ARMOR RODS

Scale: N.T.S.

DATE: 11/23/52

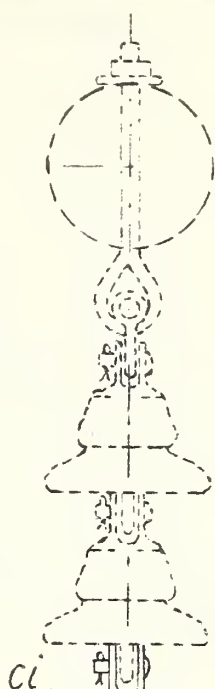
M 40-17R

NO. REVISION DATE:

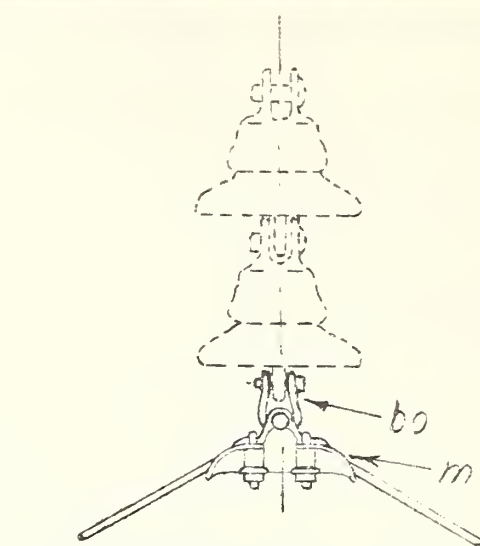


FOR RAILROAD CROSSING
ANGLE ASSEMBLY
NEUTRAL AND SECONDARY
DOUBLE SUPPORT

Use suspension clamp item "m"
for conductors with armor rods
exceeding $\frac{3}{4}$ " overall diameter.

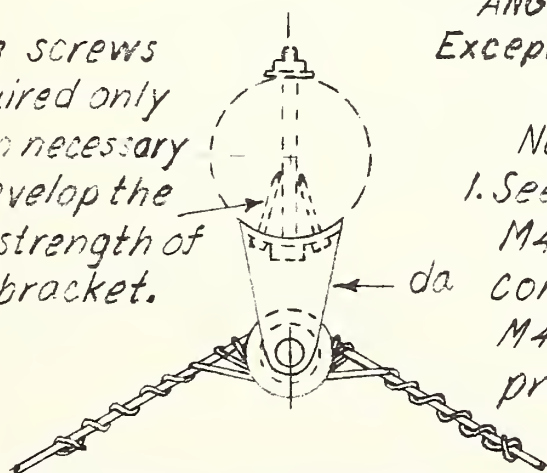


PRIMARY
ANGLE ASSEMBLY "cd"
Except at Telephone Crossings



FOR TELEPHONE CROSSING
ANGLE ASSEMBLY "cd"
with 2-bolt suspension clamp

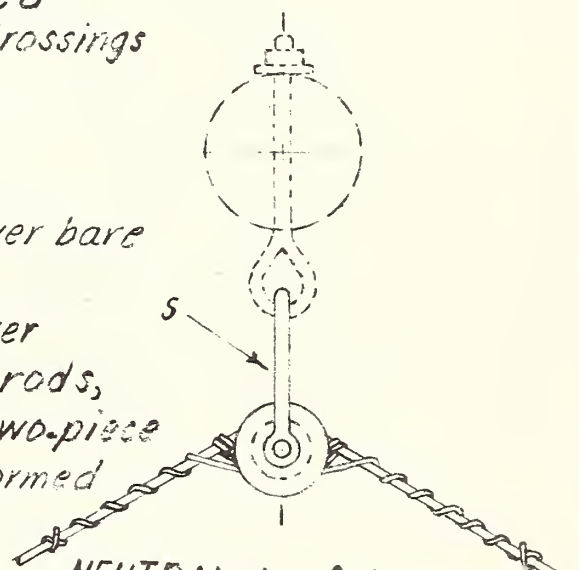
Lag screws
required only
when necessary
to develop the
full strength of
the bracket.



NEUTRAL AND SECONDARY
PREFERRED ASSEMBLY

Except at Railroad Crossings

NOTES:
1. See tying guides:
M40-1R for ties over bare
conductor,
M40-1A for ties over
preformed armor rods,
M40-1A2 for two-piece
ties over preformed
armor rods.



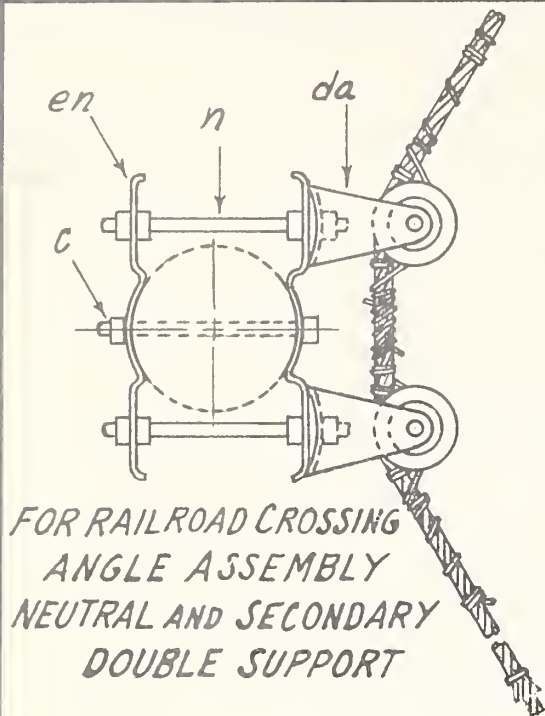
NEUTRAL AND SECONDARY
ANGLE ASSEMBLY "ce"
Except at Railroad Crossings

NOTE 2. Armor rods;
See M40-13 for preformed
armor rods over copper
type conductors.

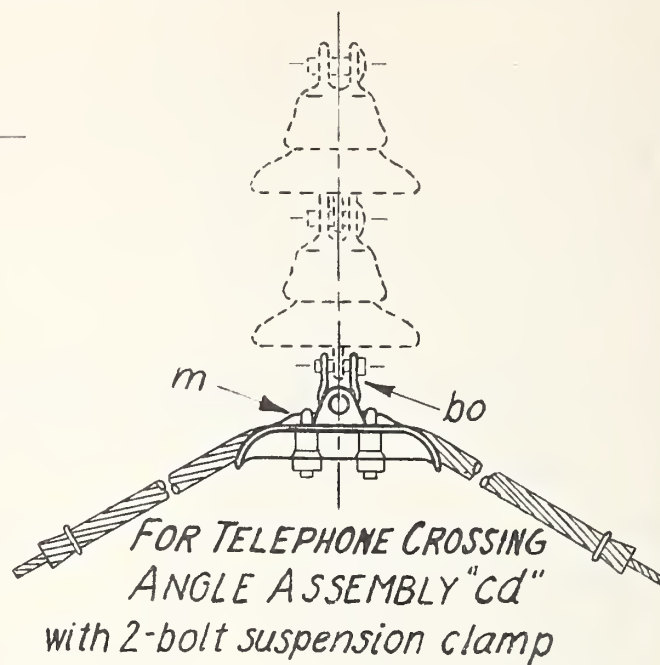
ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
c		Bolt, machine, $\frac{7}{8}$ " x reqd. lgth.	bo		Shackle, anchor
m		Clamp, suspension	da		Bracket, insulated
n		Bolt, double arming	ci		Clevis, thimble, side opening
s		Clevis, secondary, swinging, insulated	en		Plates, double support

ANGLE ASSEMBLY GUIDE, VERTICAL CONSTR. 30° TO 60° ANGLE
COPPER TYPE CONDUCTORS
WITH OR WITHOUT PREFORMED ARMOR RODS

Redrawn	2-2-53	Scale: 1 1/2" = 1'-0"	Date: Feb. 2, 1953
No. REVISION	DATE		M41-1R1



FOR RAILROAD CROSSING
ANGLE ASSEMBLY
NEUTRAL AND SECONDARY
DOUBLE SUPPORT



FOR TELEPHONE CROSSING
ANGLE ASSEMBLY "cd"
with 2-bolt suspension clamp

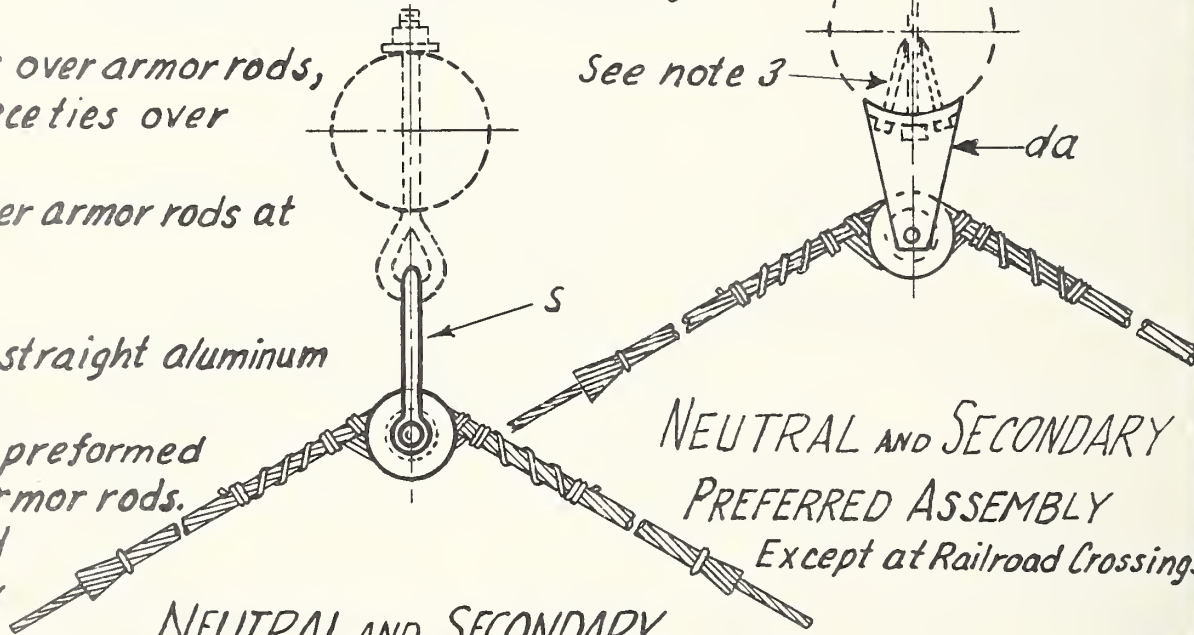
Armor rods
and clips

PRIMARY
ANGLE ASSEMBLY "cd"

Except at Telephone Crossings

- NOTES:
- See tying guides;
M40-10R1 for ties over armor rods,
M40-2R1 for two-piece ties over
armor rods.
M40-17R for ties over armor rods at
double insulator.
 - Armor Rods;
See M40-11R for straight aluminum
armor rods.
See M40-12R1 for preformed
aluminum alloy armor rods.
 - Lag screws required
only when necessary
to develop the full
strength of the
bracket.

See note 3



NEUTRAL AND SECONDARY
ANGLE ASSEMBLY "ce"

Except at Railroad Crossings

ITEM	NO. REQD.	MATERIAL	ITEM	NO. REQD.	MATERIAL
c		Bolt, machine, 5/8" x req'd. lg'th.	n		Bolt, double arming
m		Clamp, suspension	en		Plates, double support
s		Clevis, Secondary, swinging, insulated	bo		Shackle, anchor
			da		Bracket, insulated

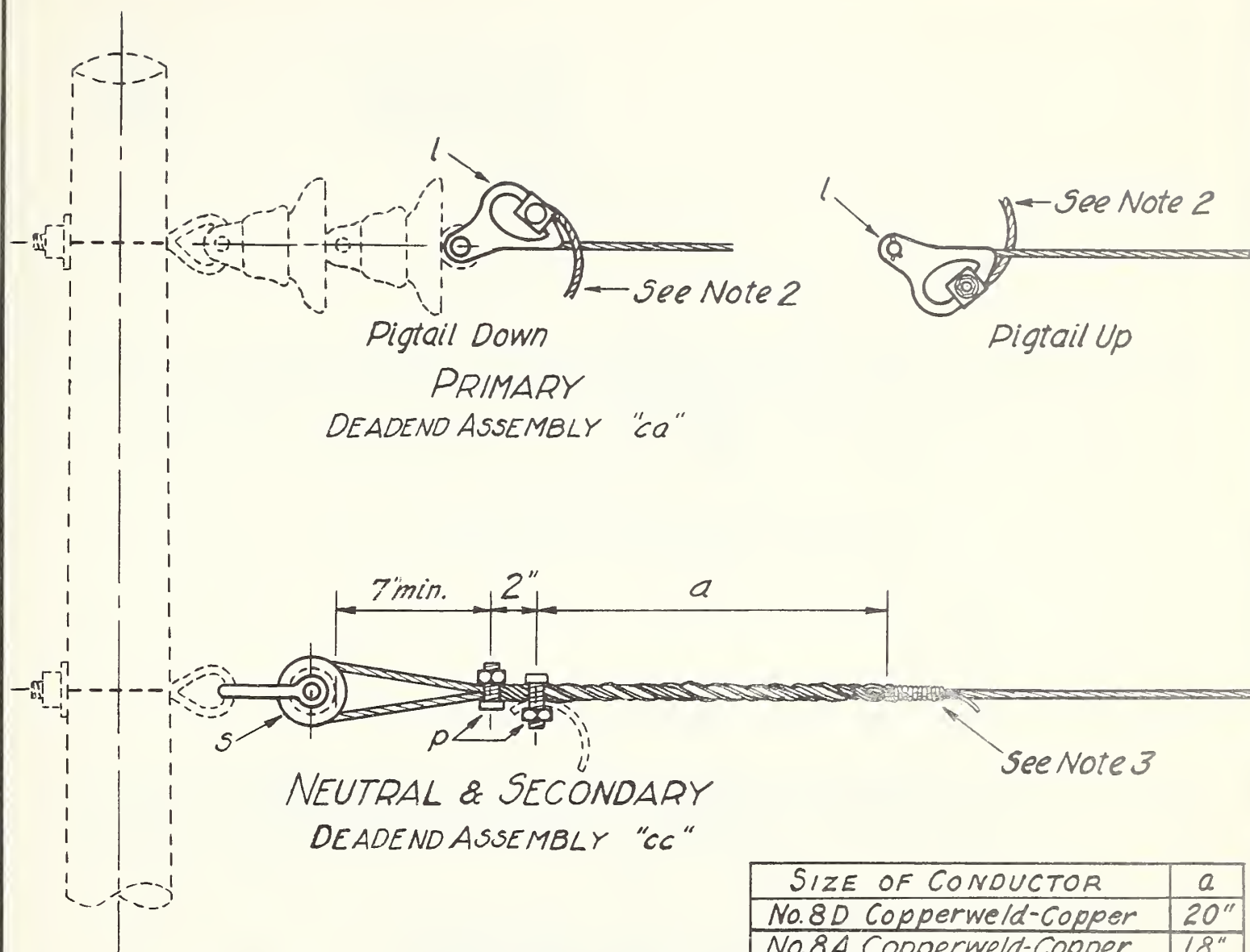
ANGLE ASSEMBLY GUIDE, VERTICAL CONSTR.-30° TO 60° ANGLE
ACSR CONDUCTORS WITH STRAIGHT OR PREFORMED ARMOR RODS

Scale: 1 1/2" = 1'-0"

Date:

M41-10R1

2	Added R.R. crossing Assembly	2-2-53
1	Added Preferred Assembly	8/15/48
NO	REVISION	DATE



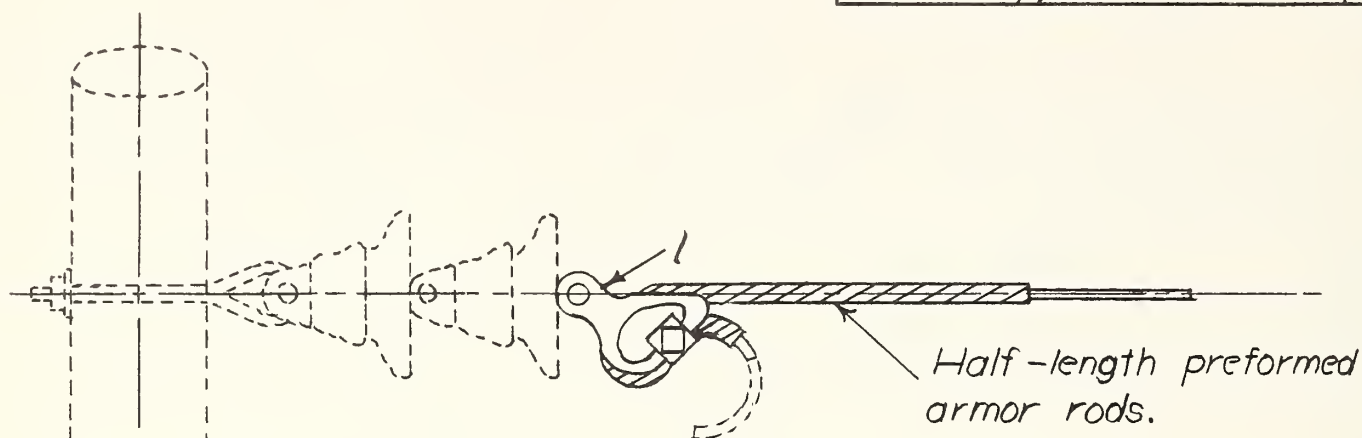
Notes:

- 1.- For alternate method of deadending primary conductors, see Drawing M 42-21R.
- 2.- Bend pigtail away from line conductor to avoid chafing.
- 3.- Wrap free end of conductor along line conductor using same lay. Extend one strand of free end (for copperweld-copper this is the copperweld strand) against line conductor. Serve the other two strands six turns each and cut them off. (Always serve copper strand(s) first.) Bend extended strand away from line conductor and cut off.

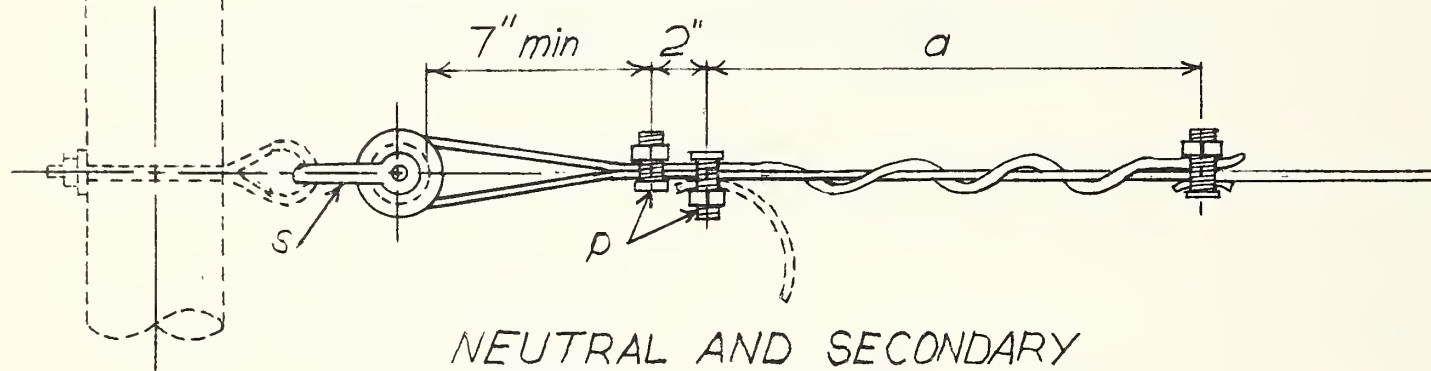
ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
l		Clamp, deadend	s		Clevis, secondary, swinging, insulated
p		Connectors, as req'd.			

			DEADEND ASSEMBLY GUIDE-DEADEND CLAMP METHOD COPPERWELD-COPPER & STRANDED COPPER CONDUCTORS	
			Scale 1½"=1'0"	Date:
1.	Added 8D Cw. Cu.	4/15/48		
NO.	REVISION	DATE	M42-3	

Size of Conductor	a
No. 6 Copper	18"
No. 4 Copper	20"



PRIMARY DEADEND ASSEMBLY "cd"



NEUTRAL AND SECONDARY DEADEND ASSEMBLY "cc"

Notes:

1. Line conductors to be in center of connectors for protection as shown.
2. Connectors to be tightened by using two wrenches to avoid kinking conductors.
3. Copper wire shim 2" long at third connector to prevent nicking of conductor.

ITEM	NO. REQ'D	MATERIAL	ITEM	NO. REQ'D	MATERIAL
1		Clamp, Deadend			
p		Connectors as req'd			
s		Clevis, secondary, swinging insulated			

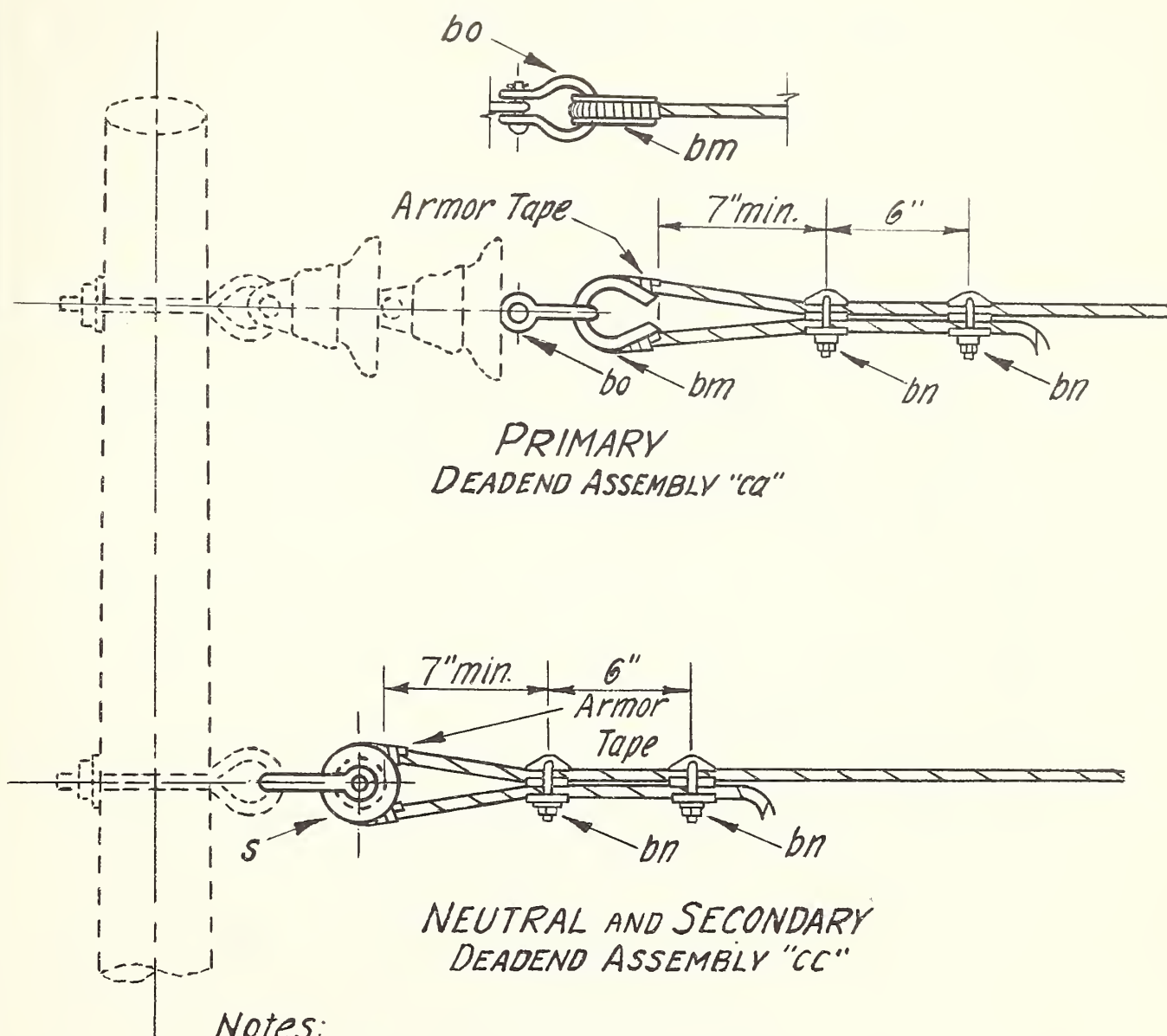
DEADEND ASSEMBLY GUIDE
SOLID COPPER CONDUCTOR #4 AND #6

Scale: 1/2"=1'-0"

Date: July 6, 50

No. REVISION Date:

M42-4



Notes:

- 1.-Armor tape wrapping to extend not more than two wraps beyond the mouth of guy thimble or spool insulator.
- 2.-For $\frac{1}{2}$ and larger use 3" thimble clevis for primary, and spool insulator of 3" min. groove diameter for secondary and neutral.
- 3.-For alternate method of deadending primary and neutral conductors see Drawing M42-11R.

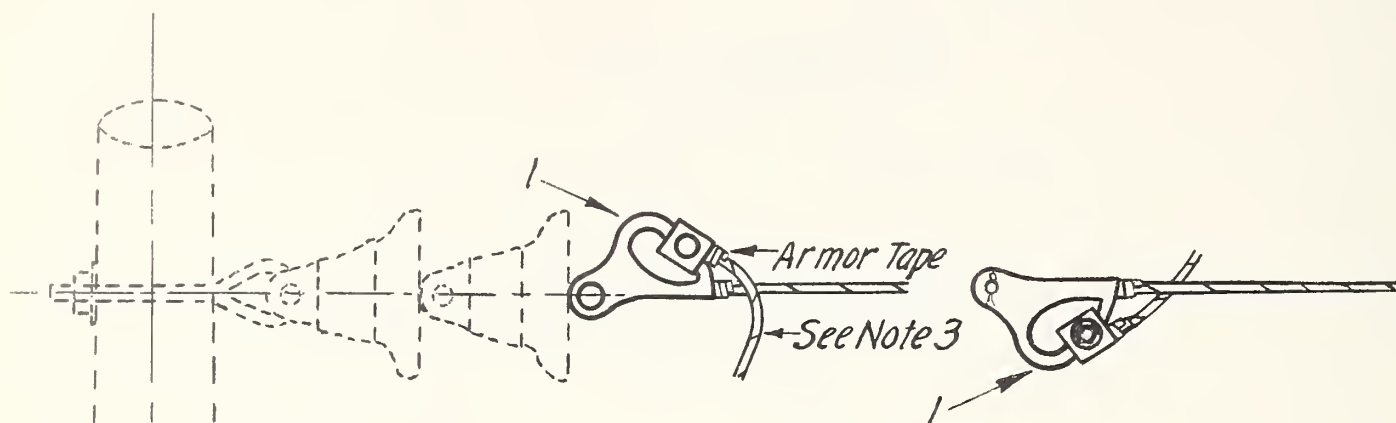
ITEM	MATERIAL	ITEM	MATERIAL
s	Clevis, secondary, swinging, insulated	bo	Shackle, anchor
bm	Thimble, guy, $\frac{5}{8}$ "		
bn	Clamp, loop deadend		

**DEADEND ASSEMBLY GUIDE
A.C.S.R. CONDUCTORS**

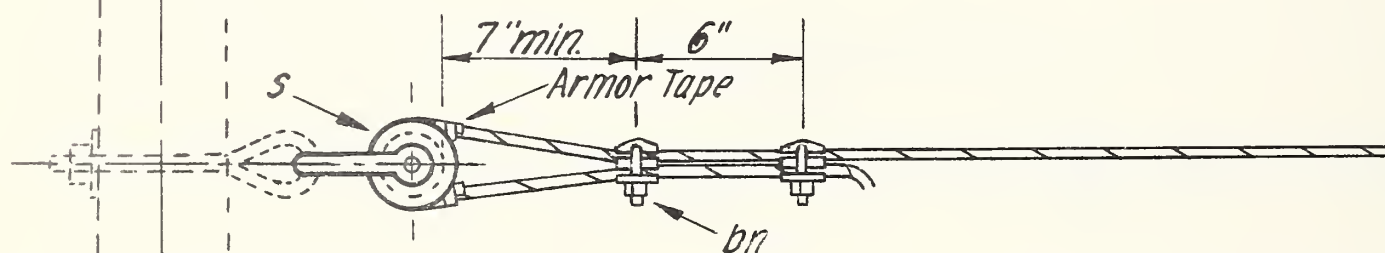
Scale: $1\frac{1}{2}" = 1'-0"$

Date:

No	REVISION	DATE	M42-10
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PRIMARY
DEADEND ASSEMBLY "ca"



NEUTRAL AND SECONDARY
DEADEND ASSEMBLY "cc"

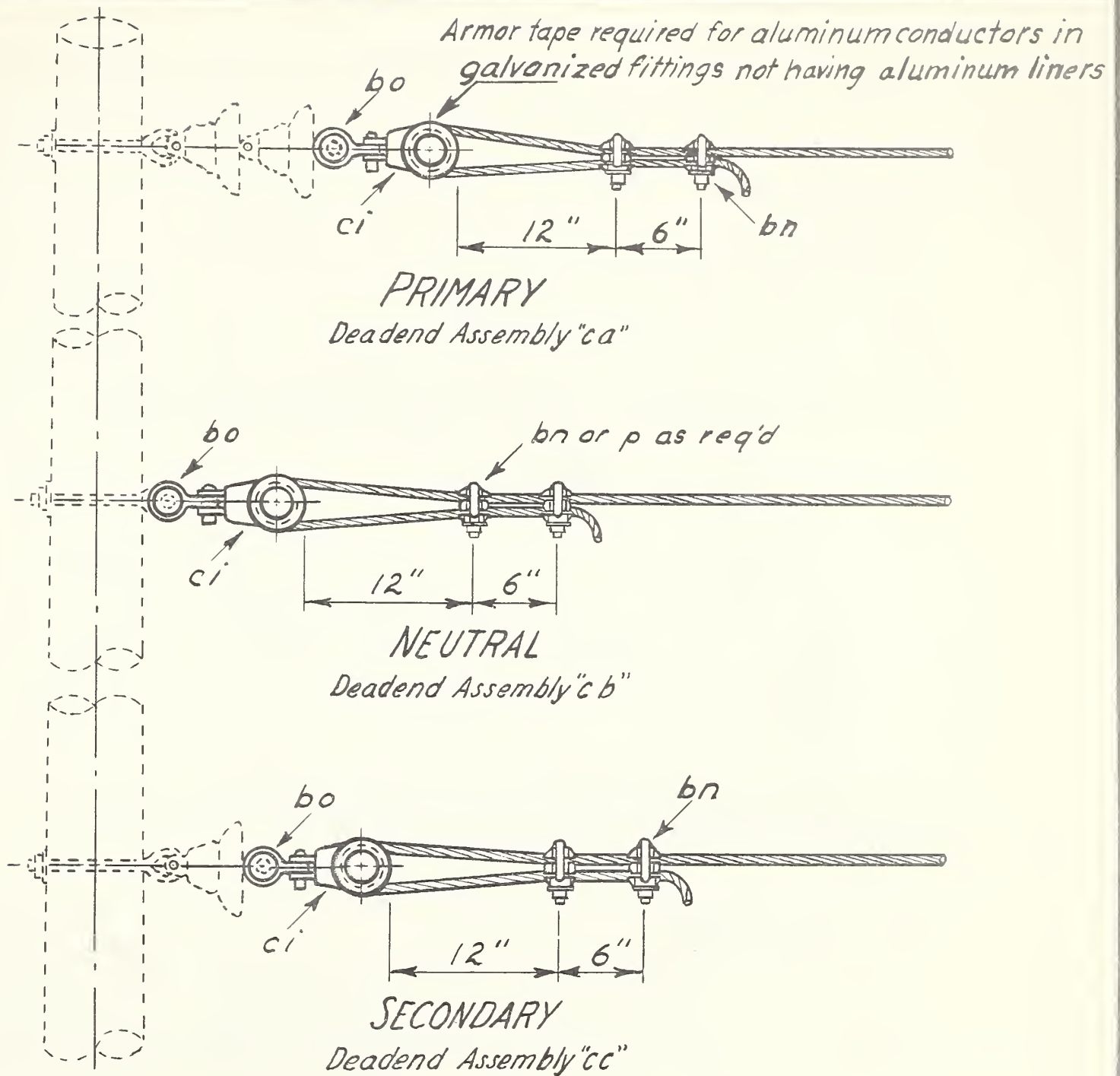
Notes:

1. - Armor tape wrapping to extend not more than two wraps beyond the mouth of deadend clamp or spool insulator.
2. - For alternate method of deadending primary and neutral conductors, see Drawing M42-10.
3. - Bend pigtail away from line conductor to avoid chafing.
4. - Armor tape wrapping not required when aluminum or aluminum-lined clamps are used.
5. - For $\frac{1}{0}$ and larger use spool insulator of 3" min. groove diameter on neutral and secondary deadends.

ITEM	MATERIAL	ITEM	MATERIAL
1	Clamp, deadend		
bn	Clamp, loop deadend		
s	Clevis, secondary, swinging, insulated		

DEADEND ASSEMBLY GUIDE-DEADEND CLAMP METHOD
A. C. S. R. CONDUCTORS

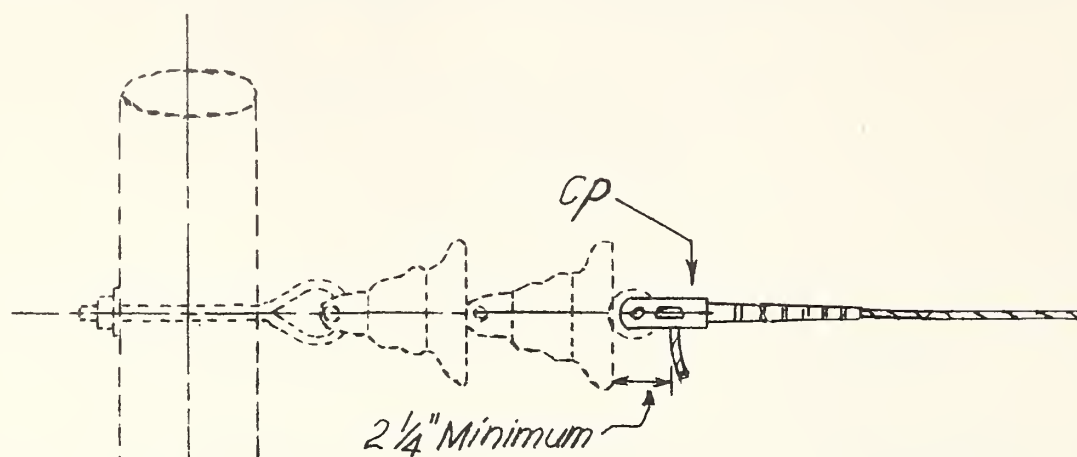
1	Elimated primary tap	1-6-52	Scale: 1/2"=1'-0"	Date:
No	REVISION	DATE		M42-11R



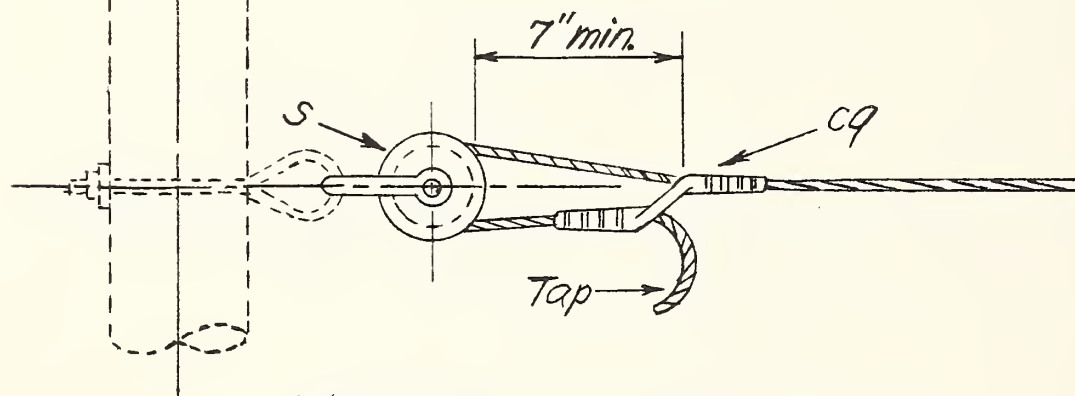
NOTES:

These assemblies or deadend clamps should be substituted for other assemblies using the guy thimble and anchor shackle or other equivalents on the primary, and the secondary clevis on neutral and secondary when the breaking strength of the conductor is more than 4500 pounds.

ITEM	No. REQ'D	MATERIAL	ITEM	No. REQ'D	MATERIAL
bn		Clamp, loop deadend or	bo		Shackle, anchor
p		Connectors, as req'd.	ci		Clevis thimble, side op'ng
			DEADEND ASSEMBLY GUIDE (LARGE CONDUCTORS)		
			Scale: 1"=1'-0"		
			Date: Dec. 8, '47		
No.	REVISION	DATE	M42-13		



PRIMARY
DEADEND ASSEMBLY "CA"



NEUTRAL AND SECONDARY
DEADEND ASSEMBLY "CC"

ITEM	No. REQD	MATERIAL	ITEM	No. REQD	MATERIAL
S		Clevis, secondary, swinging, insulated	c9		Sleeve, offset, splicing
cp		Sleeve, deadend, compression			

DEADEND ASSEMBLY GUIDE-COMPRESSION METHOD
COPPER TYPE CONDUCTORS

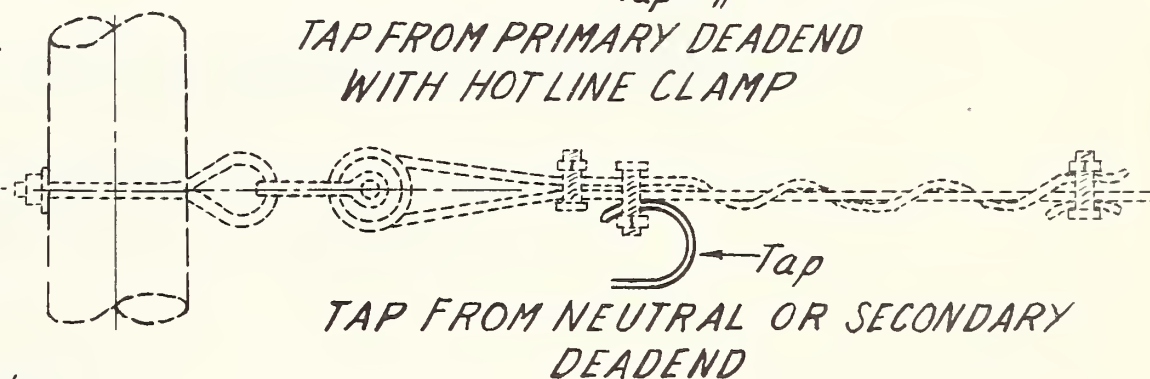
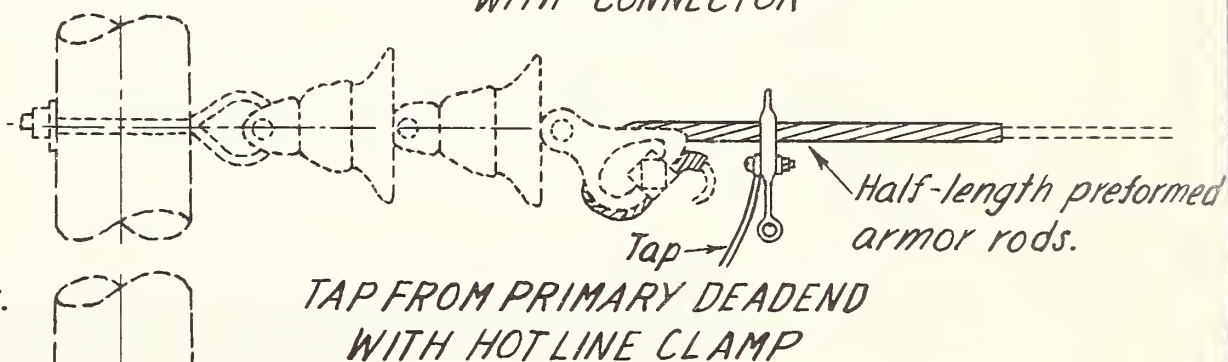
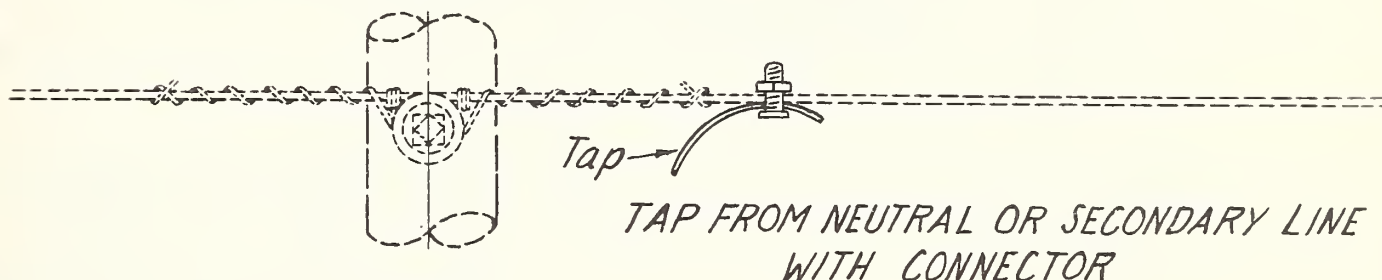
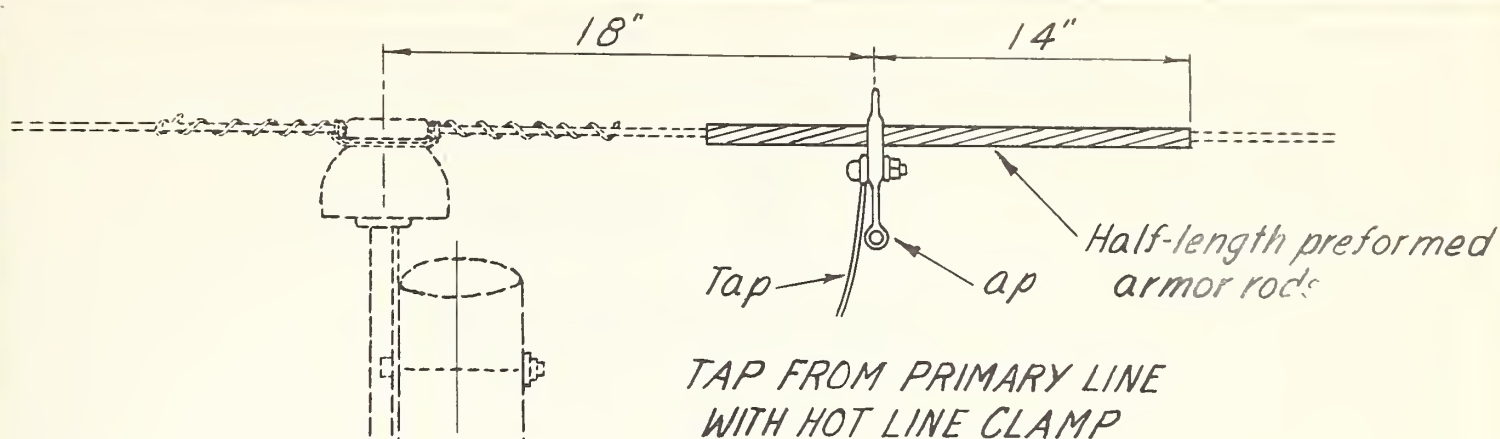
Scale: 1 1/2"=1'0"

December 4, '52

No. REVISION

DATE:

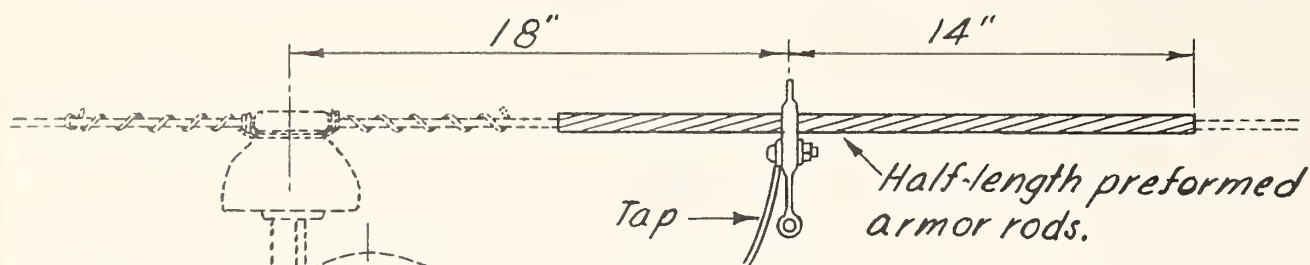
M42-21R



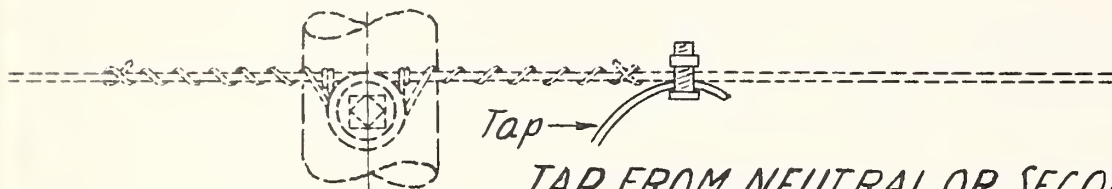
NOTES:

1. Taps to be slack.
2. For details of deadends see drawing NO. M42-4.
3. Arrangement shown on M42-10 may be used for neutral and secondary deadend if preferred.

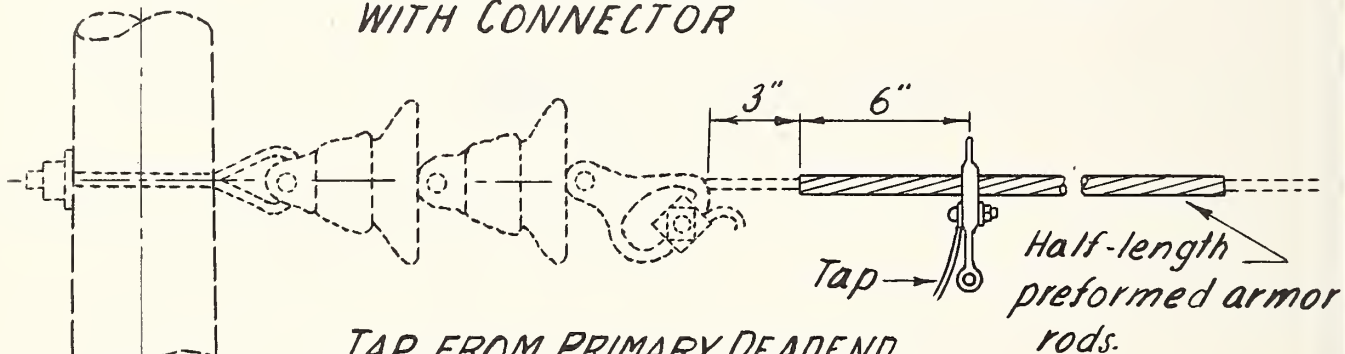
ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
p		Connectors, as required			
ap		Clamp, hot line, tap assembly			
			TAP ASSEMBLY GUIDE		
			SOLID COPPER CONDUCTORS		
			Scale: 1/2" = 1'-0"		Date: Aug. 8, 1949
No.	REVISION		DATE:	M43-3	



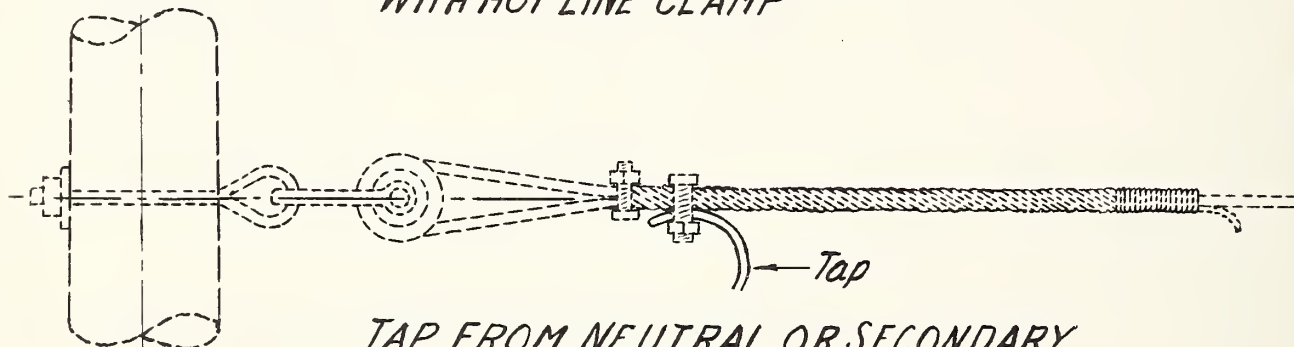
TAP FROM PRIMARY LINE



*TAP FROM NEUTRAL OR SECONDARY LINE
WITH CONNECTOR*



*TAP FROM PRIMARY DEADEND
WITH HOT LINE CLAMP*



*TAP FROM NEUTRAL OR SECONDARY
DEADEND*

NOTES:

1. Taps to be slack
2. For details of deadends see drawing No. M42-3.
3. Arrangement shown on M42-10 may be used for neutral and secondary deadend if preferred.

ITEM	NO. REQ'D.	MATERIAL	ITEM	NO. REQ'D.	MATERIAL
p		Connectors, as required			
ap		Clamp, hot line, tap assembly			

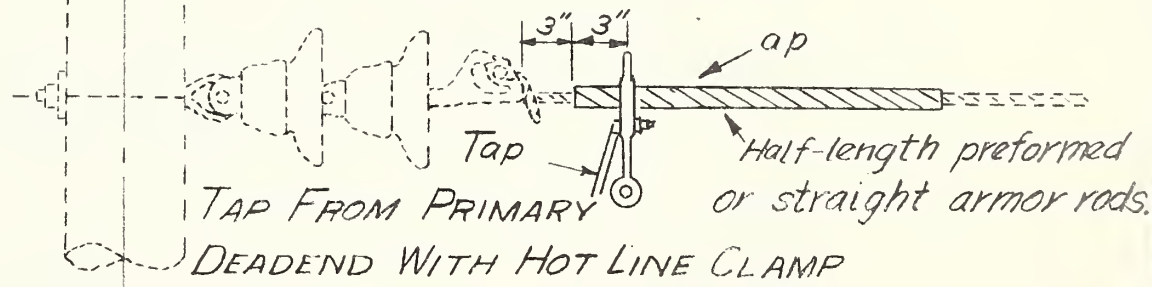
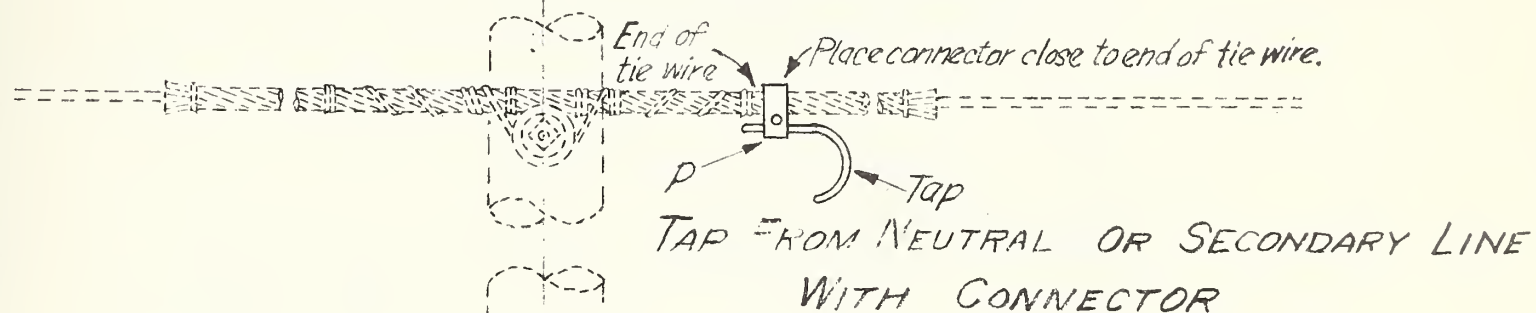
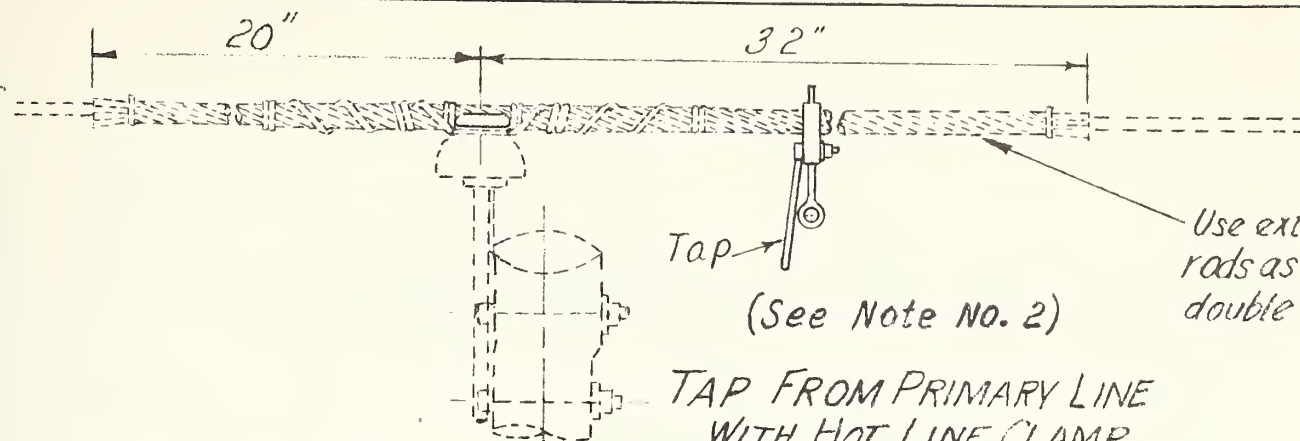
TAP ASSEMBLY GUIDE
COPPERWELD-COPPER AND STRANDED COPPER CONDUCTORS

Scale: 1 1/2" = 1'-0"

Date: Aug. 10, 1949

NO. REVISION DATE:

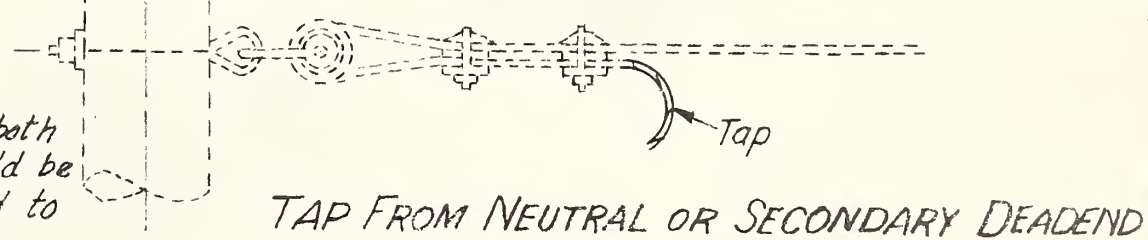
M43-4



For tap without hot line clamp, omit half-length armor and extend pigtail from clamp.

NOTES:

1. When installing armor rods on existing lines both conductor and rods should be wire brushed or scraped to provide clean contacts.
2. Hot line clamp should be located as close to the end of the tie wire as possible in order to avoid jumper failure due to vibration.



ITEM	NO. REQ'D	MATERIAL	ITEM	NO. REQ'D	MATERIAL
P		Connector (parallel groove clamp)			
ap		Clamp, hot line, tap assembly			

TAP ASSEMBLY GUIDE
A.C.S.R. CONDUCTORS

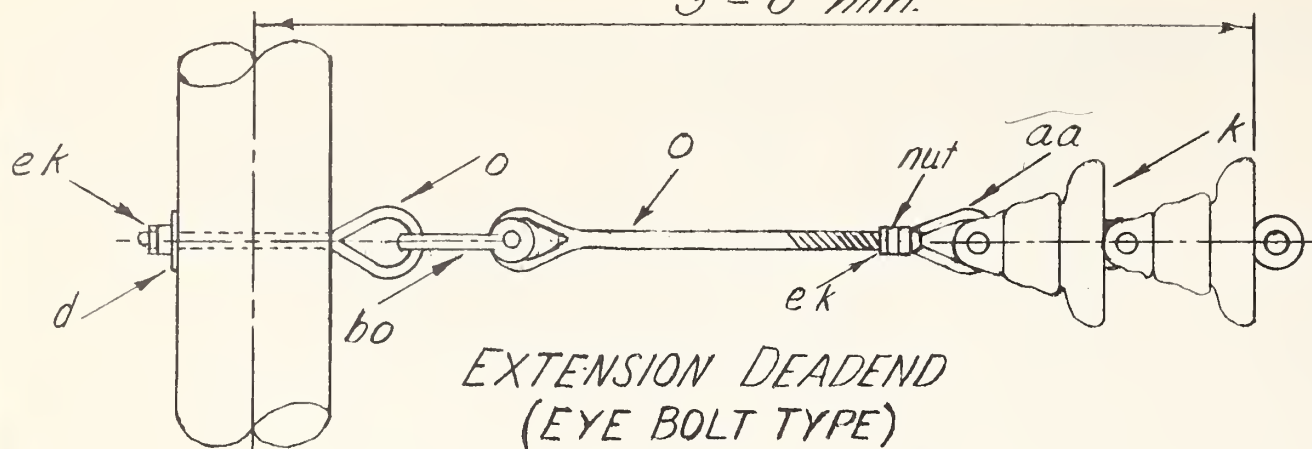
Scale: 1"=1'-0"

Date: 4-27-51

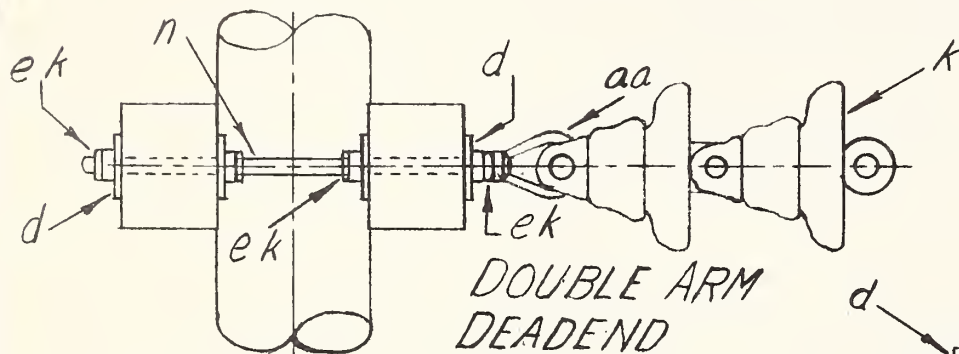
M43-10R

NO.	REVISION	DATE
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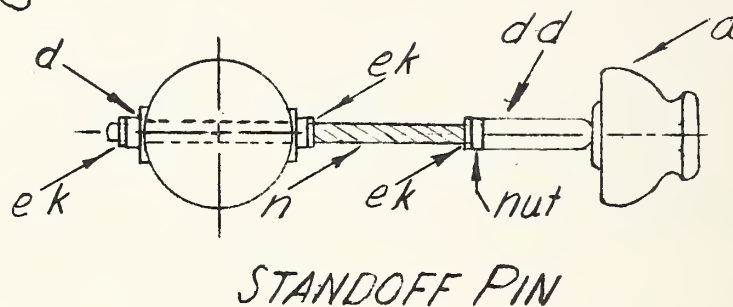
3'-0" min.



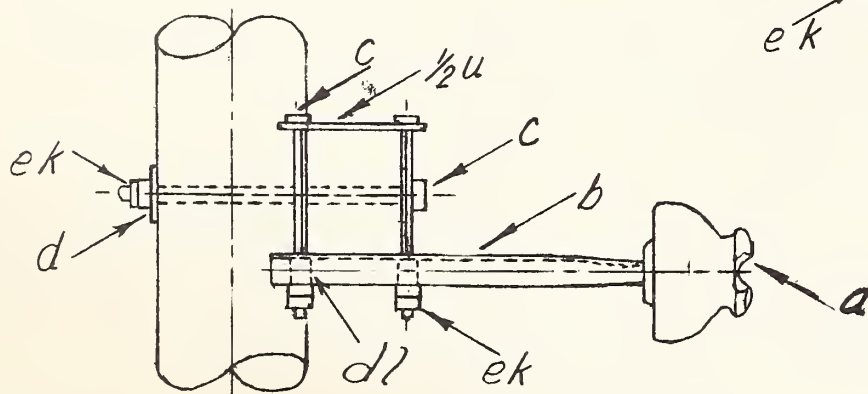
EXTENSION DEADEND
(EYE BOLT TYPE)



DOUBLE ARM
DEADEND



STANDOFF PIN



JUMPER BRACKET

ITEM	NO. REQD	MATERIAL	ITEM	NO. REQD	MATERIAL
a		Insulator, pin type	u		Clamp, guy, 3 bolt type
b		Pin, pole top, 15"	aa		Nut, eye, 5/8"
c		Bolt, machine, 5/8"x req'd. length	bo		Shackle, anchor
d		Washer, 2 1/4"x 2 1/4"x 3/16", 13/16" hole	dd		Adapter, insulator
k		Insulator, suspension	ek		Locknut
n		Bolt, double arming, 5/8"x req'd. lg.	dl		Pipe spacer, pole pin
o		Bolt, eye, 5/8"x req'd. length			

3 Double arm bolt type extension 5-26-53

deadend, replaced with eye bolt type

2 Removed link type deadend 5-26-52

1 Added link type deadend 11-9-49

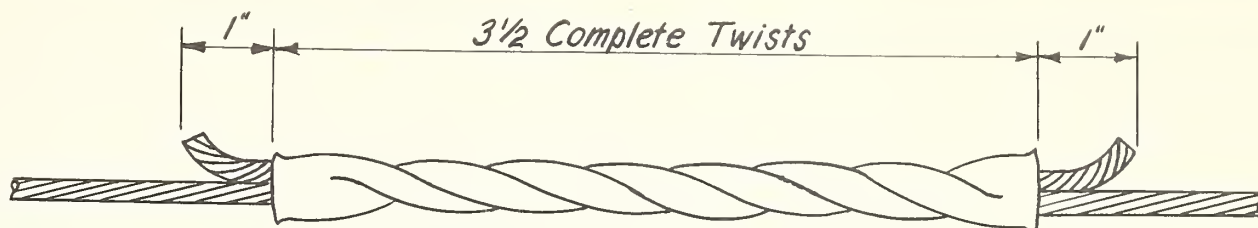
NO. REVISION DATE:

PRIMARY ASSEMBLY GUIDE

Scale 1/2"=1'-0"

Date: May 3, 1949

M44-1R1



NOTE -

Single Tube, Oval, Copper Sleeve

Before making joint be sure that inside of tube and ends of conductor to be inserted in tube are free from dirt and grease, etc., in other words - perfectly clean.

Splice shall not be within 10 feet from insulator.

For 9 1/2 D, and 3 no. 12 Copperweld strands use same as 8C Copperweld-copper.

For #4 and #6 copper make 4 complete twists.

On stranded conductors each sleeve should be twisted so that its helix is in the opposite direction to the lay of the strand.

SIZE OF CONDUCTOR	NUMBER OF WIRES.	SLEEVE LENGTH, INCHES.	WEIGHT OF SLEEVE, POUNDS.
#3/0 - 7 Strand HD Copper	7	18	.95
#2/0 - 7 Strand HD Copper	7	16	.74
#1/0 - 7 Strand HD Copper	7	14	.60
#1-3 Strand Copper	3	14	.60
#2-3 Strand Copper	3	12.5	.40
#4 - Copper Wire	1	7.5	.13
#6 - Copper Wire	1	6	.07
#4A Copperweld-Copper	3	11	.31
#6A Copperweld-Copper	3	8.5	.16
#8A Copperweld-Copper	3	7.5	.13
#8C Copperweld-Copper	3	6.75	.11
#8D Copperweld-Copper	3	8.5	.16

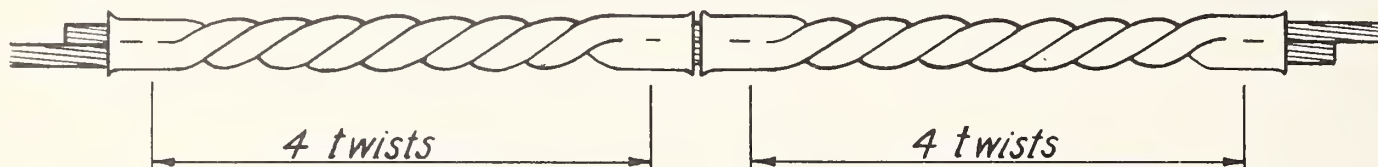
SPLICING GUIDE-OVAL TUBE TYPE COPPER AND COPPERWELD-COPPER

Scale: N.T.S.

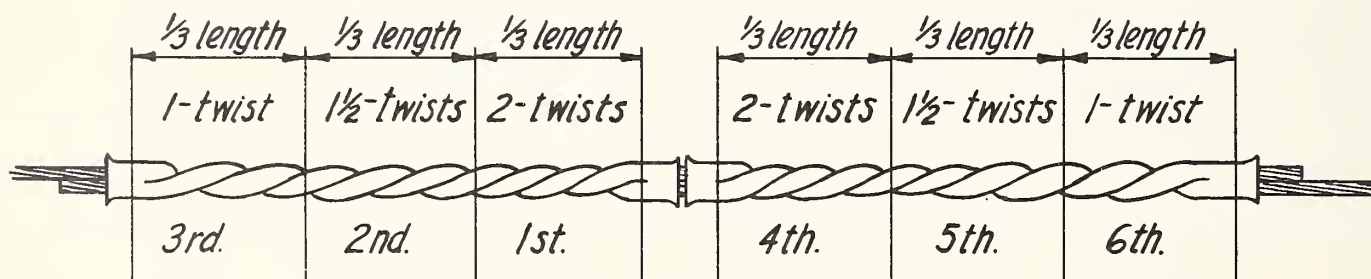
Date: Apr. 14, 1948

1	Table Revised	11/15/48
NO.	REVISION	DATE

M45-1R



For sizes no's 2, 4, and 6



For sizes 1/0 and larger

NOTES:

For sizes 1/0 and larger

give each sleeve 4 1/2 complete twists distributed as shown in sketch. This requires three different settings of the twisting wrenches. Make these in the order shown in the sketch.

At the end of the joint the wrench should not be placed closer than 1/4" to the end of the sleeve.

Before making joint be sure that inside of tubes and ends of cable to be inserted in tubes are free from dirt and grease, etc., in other words—perfectly clean.

Splice shall not be within 10 feet from insulator.

SPLICING GUIDE A.C.S.R. CONDUCTOR

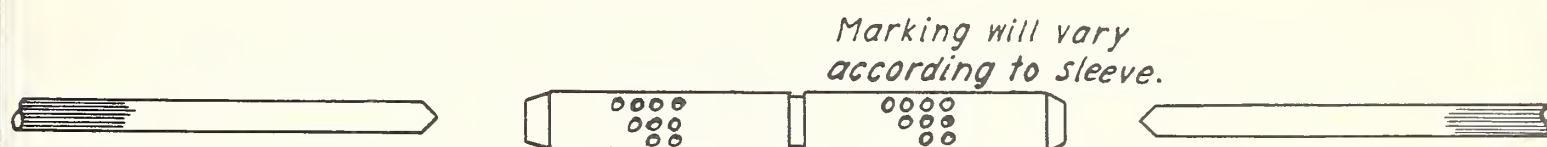
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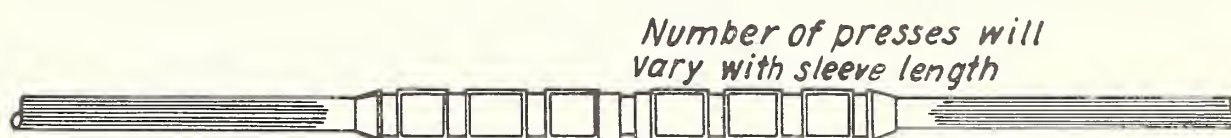
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*COPPER COMPRESSION SLEEVE
BEFORE SPLICING*



COPPER COMPRESSION SPLICE COMPLETE

NOTE:

Clean the wire with abrasive cloth before making the splice.

Splice shall not be within 10 feet of insulator.

Begin presses at center of sleeve and work toward ends, press entire length of sleeve, spacing presses about $\frac{1}{16}$ " to $\frac{1}{8}$ " apart.

Groove letters printed on sleeves correspond to groove letters printed on tool, as a 4I-MJ tool takes both "M" and "J" sleeves, a 5I-XJ tool takes both "X" and "J" sleeves and so on.

*SPLICING GUIDE-COMPRESSION TYPE
COPPER TYPE CONDUCTORS*

Scale: N.T.S.

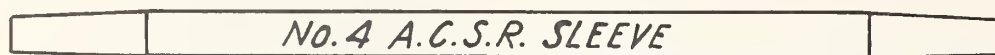
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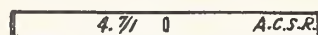
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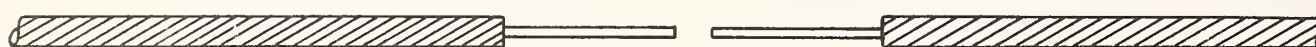


ALUMINUM SLEEVE

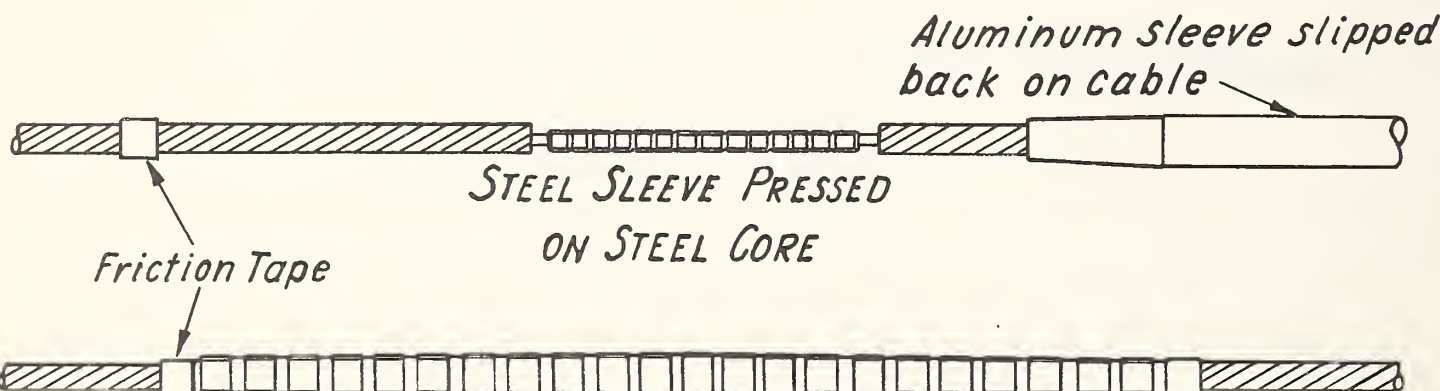


STEEL SLEEVE

Sleeves are marked to indicate conductor size.



A.C.S.R. READY FOR SPLICING



COMPLETED SPLICE

DIRECTIONS FOR MAKING A.C.S.R. SPLICE

1. Slip Aluminum Sleeve on cable far enough back to be out of the way. Cut back Aluminum Strands at end of cable $\frac{3}{8}$ " more than half the length of steel sleeve.
2. Insert steel core wires in the steel sleeve and press with inner groove of tool. Press entire length of sleeve starting at the middle and working toward the ends. Leave about $\frac{1}{16}$ " space between presses.
3. Straighten steel sleeve by hammering carefully against a suitable block.
4. Place a piece of friction tape on the cable to mark the position of the end of the Aluminum sleeve such that it will be centered on the splice.
5. Paint the steel sleeve, and the adjacent cable that will be covered by the Aluminum sleeve, with a suitable corrosion inhibitor such as a filler paste of 70% zinc chromate and 30% raw linseed oil, or such other inhibitor as may be approved by the conductor manufacturer.
6. Slip the Aluminum sleeve in place and press with the outer groove of tool using the same procedure as with the steel sleeve.
7. Straighten entire splice by hammering carefully against a suitable block.
8. Splice shall not be within 10 feet from insulator.

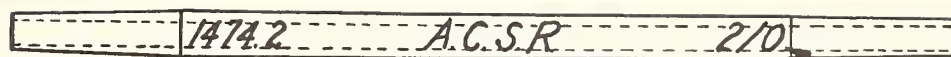
SPLICING GUIDE-COMPRESSION TYPE A.C.S.R. CONDUCTOR

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1	Changed note No. 5	1-30-5
No	REVISION	DATE

M45-21R

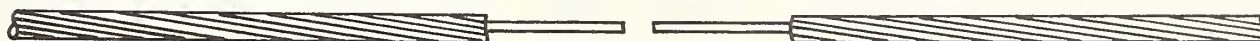


TUBULAR ALUMINUM SLEEVE

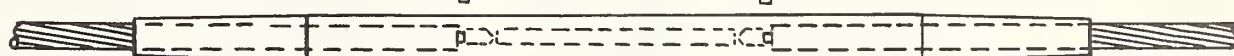


TUBULAR STEEL SLEEVE

Sleeves marked for conductor size and catalog number.



A.C.S.R. READY FOR SPLICING



BEFORE COMPRESSION - TUBULAR COMPRESSION JOINT FOR A.C.S.R.



AFTER COMPRESSION - TUBULAR COMPRESSION JOINT FOR A.C.S.R.

METHOD OF APPLYING TUBULAR COMPRESSION JOINT

Caution: Before applying make sure the bores are thoroughly clean.

1. Slip the aluminum compression sleeve over one cable end and back it out of the way along the cable.
2. Using a hack saw, cut off the aluminum strands from each cable end, exposing the steel core for a distance of about $\frac{3}{8}$ " more than half the length of the steel compression sleeve. Use care not to nick the steel core with the saw. Before cutting serve the cable with wire just back of the cut.
3. Insert the steel core ends into the steel compression sleeve, making sure that the ends are jammed against the stop in the middle of the sleeve.
4. Compress the steel sleeve over its entire length, using the compressor dies marked "S" in their catalog number, making the first compression at the center and working out towards the ends, allowing dies to always overlap their previous position.
5. Remove serving from the cable and slip the aluminum sleeve over the steel joint. Center the aluminum sleeve by sighting the ends of the steel joint thru the filler holes provided in the aluminum sleeve.
6. Using the pressure gun equipped with the tapered nozzle provided with the Model "B" compressor equipment, inject a filler paste thru both holes in the aluminum sleeve until the space between it and the steel joint is completely filled. This can be observed thru the filler holes. The nozzle of the pressure gun should be jammed tightly in the filler holes to prevent the paste oozing back during injection.
7. Insert the plugs in the filler holes and hammer them firmly in place. They will be securely locked in compressing the aluminum joint.
8. Finally, compress the aluminum sleeve, using the dies marked "A" in their catalog number. Make the first two compressions with the inner edges of the dies matching the positions stencilled on the aluminum sleeve. Make additional compressions advancing to ends, allowing dies to always overlap previous position.

NOTE: - Filler paste preferred is composed of approx. 70% zinc chromate, 30% raw linseed oil, by wgt. Source of this material may be obtained from nearest sales office.

SPLICING GUIDE - COMPRESSION TYPE A.C.S.R. CONDUCTORS 2/0, 3/0, 4/0 (1/0 OPTIONAL)

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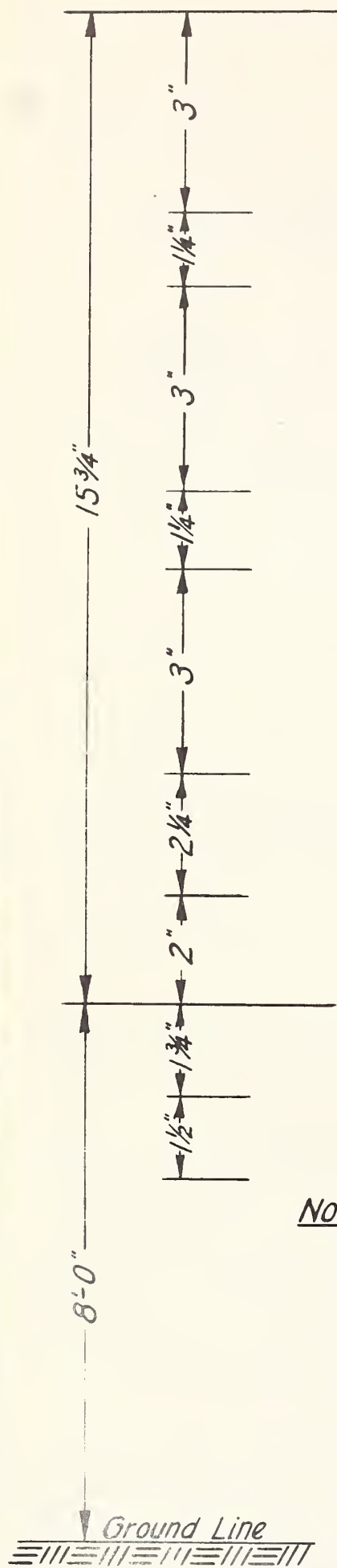
Date: Apr. 21, 1948

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Date



REA

CO-OP

1A23

M52-2
includes
Letters only

M52-1
includes
Letters
and Numbers

M52-3
includes
Numbers only

May be placed
1A
23
instead of as shown

NOTE:

Pole numbers and letters shall be of cutout aluminum or electro-galvanized soft steel, fastened to pole with at least 1" nails, barbed full length with galvanized round head.

REA to be 3" high, Co-op to be 2" high.

1A23 to be 1 1/2" to 3" high. If 3" characters are used they should be placed vertically instead of as shown. Legends to be staggered 30° from direct facing highway. When line crosses highway or R.R. legend should face same. On poles having limited climbing space due to special equipment, legend should be so located as to leave climbing space quadrant unobstructed.

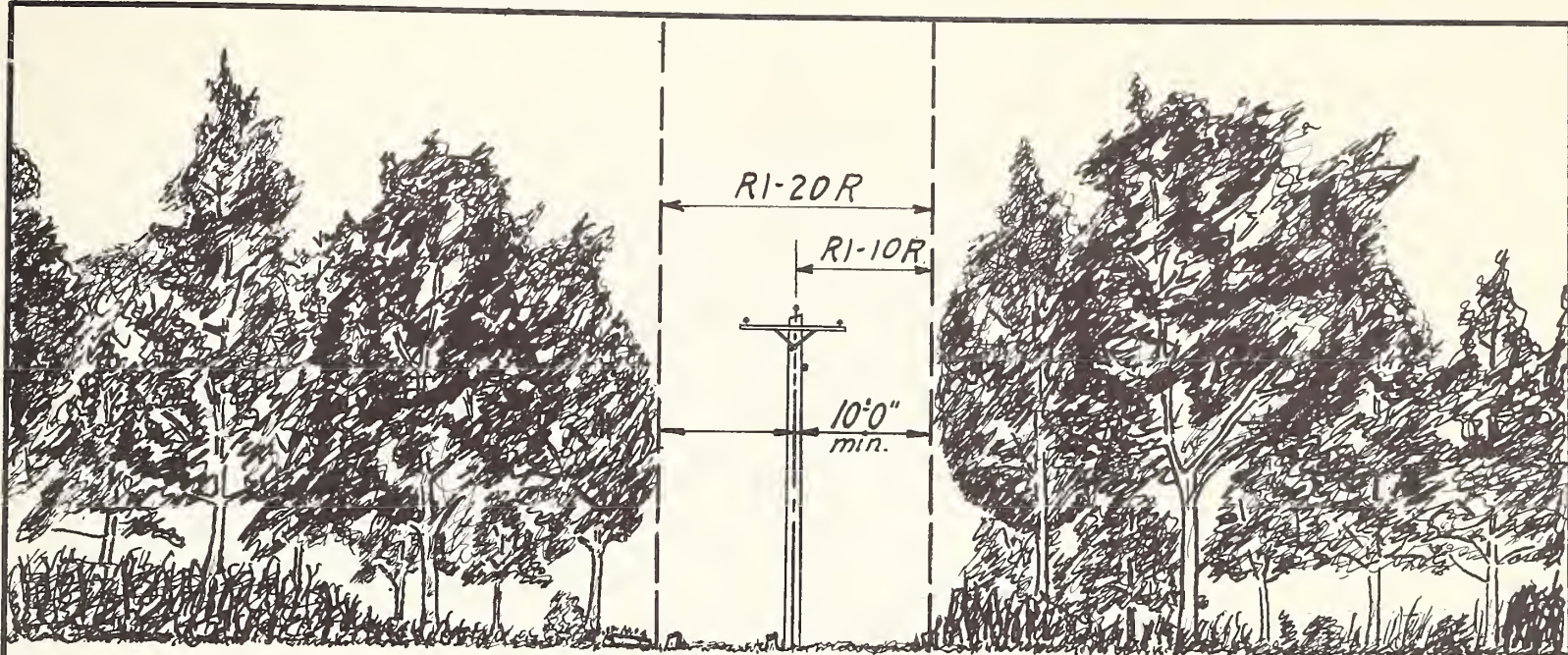
POLE NUMBERING AND MARKING

1 Deleted note	M/10/40
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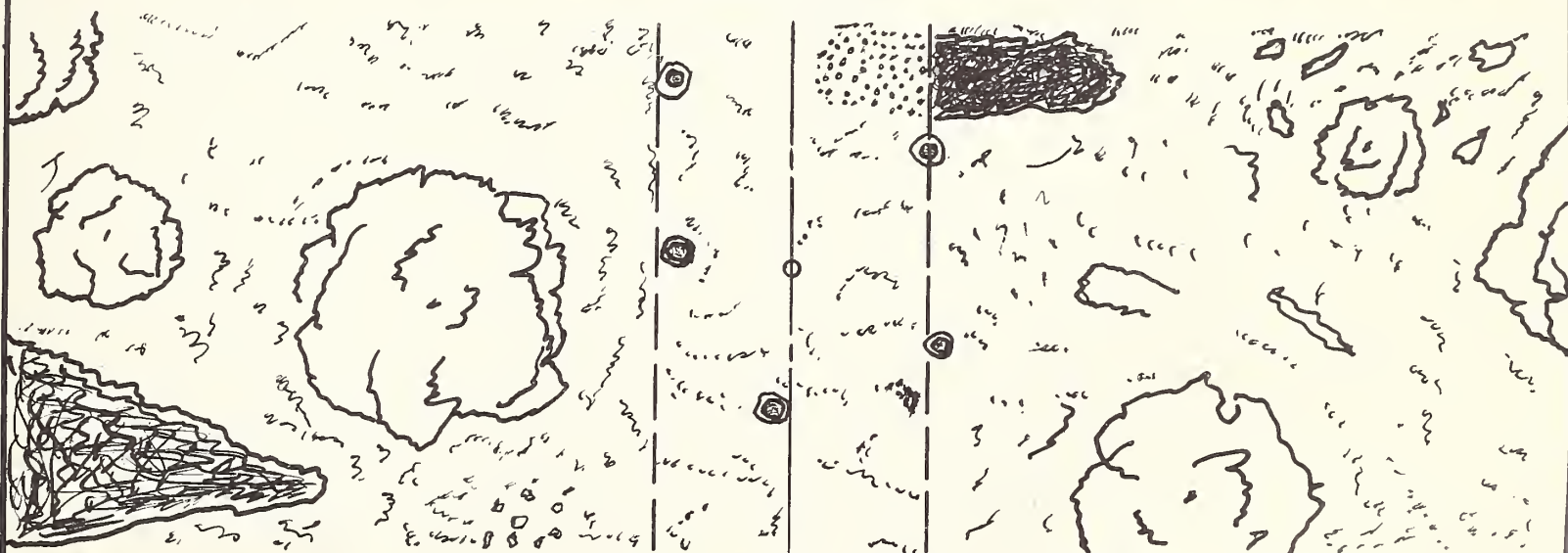
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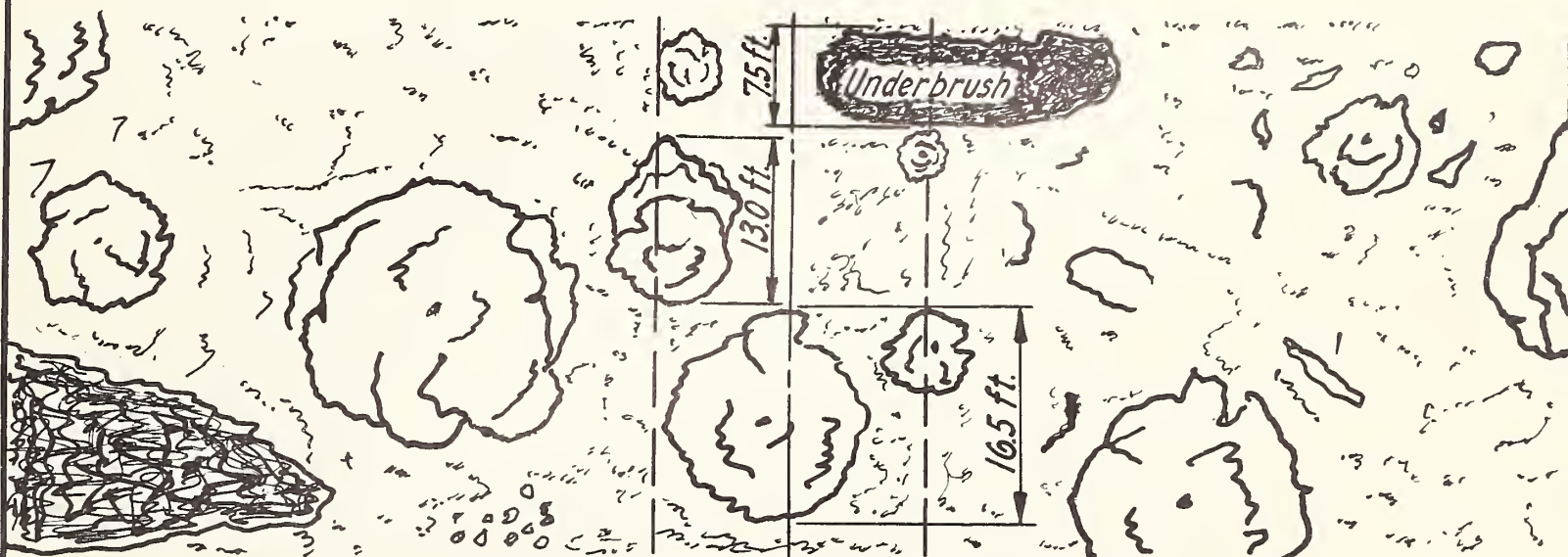
M52-1R, M52-2R, M52-3R



ELEVATION



AFTER CLEARING



BEFORE CLEARING

CLEARING RIGHT-OF-WAY GUIDE

1 Added RI-10 and RI-20 11/10/48	Scale: 1/16"=1'-0"	Date: RIR
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